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THE COVER

The world's most powerful industrial truck, capable of handling loads up to 110,000 pounds, is shown lifting highway trailer with four Oldsmobiles at factory of its manufacturer, Automatic Transportation Co.

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EDITOR'S PAGE

Let Not Thy Right Hand—

THE MAN GOT on his horse and rode off in all directions. How, pray, can we have improved efficiency in government, as advocated in the Hoover Report, and at the same time pass restrictive legislation that would eliminate and prohibit all efforts by supervisors or other officers or agents of government from increasing efficiency or even maintaining what little semblance is there already.

Efforts are being made by certain members of Congress to extend the "no stop-watch" clause used on Navy appropriation bills since 1916 to all government contracts. (See Congressional Record August 26, 1949, pp 12543-8.) In times of National emergency all our people are either directly or indirectly government workers. At the same time we are called upon for high efficiency in order to conserve our manpower and protect our National economy. Manpower shortage became acute in 1944. Increasing costs are now threatening our whole economy and the passage of a bill or an amendment to eliminate time study and incentives could be disastrous at this time.

Time Study and all its relatives in the field of industrial engineering have played a large part in giving this country world leadership in the fields of production and distribution. We can not afford to jeopardize this position. National security demands increased efficiency in the United States as our only offset against vastly greater manpower in other countries.

Attention is invited to the following quotes from the August 26, 1949 Congressional Record — Senate: pp 12545, Senator Flanders "Mr. President, I raise objection to the whole committee amendment. The first arrival on the stage of Federal legislation of this anti-stop watch provision was a good generation ago in its application to Government work in navy yards. That was in a period when time study was a new thing, and organized labor was very much opposed to it. Since that time, time study work has become the main basis of the increase in efficiency in the manufacturing and distributing business on which the ultimate raising of the standard of living of the working men depends. Time study has been the means by which the standard of living in this country has been raised. The worker does not work longer hours, he works shorter hours as a result of it. The worker does not work harder, he works easier, because the means for handling materials and handling his work and the manipulation of his machine is made easier year by year than it was before. The worker is dependent on time study for the improvement in his material conditions. There is absolutely no excuse now for ruling it out of Government work anywhere at any time. It is the workmen's friend and not his enemy.

"The situation in the plant in Vermont with which I was connected until I came to the Senate is interesting. There, in spite of being frowned upon by the national organization to which the union belongs, the union in that plant insisted on writing into its contract with the company incentive pay based on time study. The insistence came from the men, and not from the company, and that was because they were satisfied that they could properly earn more wages by that means than the company could afford to pay them otherwise.

"Mr. President, in my view the whole of section 630 is not in the public interest, and I hope the Members of the Senate will vote against it."

pp 12545, Senator Magnuson, "Mr. President, for the purpose of the RECORD I wish to make a statement concerning the pending amendment. The Senate is very familiar with the situation involved, because every year — I know every year I have been in the House or the Senate — this provision has been added to appropriation bills, particularly in relation to the Naval Establishment. Every year an attempt is made to knock out the provision. So far, in many Congresses extending back as far as 1916, such attempts have been unsuccessful.

"There is a great deal of merit in this provision. The Navy has worked satisfactorily with it for many years. There has long been a prohibition against applying the so-called stop-watch technique to Navy workmen. I know of no statement on the part of any branch of the Military Establishment — either the Army, the Navy, or the Air Force — objecting to this provision. I do not see any reason why we should change it now."

pp 12545, Senator Taft, "Mr. President, I merely wish to say that if it has been necessary to put this provision into the appropriation bills for 16 years, the time has come to stop it. If this provision is to be made applicable to present-day conditions, then it seems to me it should be done by independent legislative enactment; it should not come up every year on an appropriation bill, without consideration, without opportunity for the hearings which should be given to straight legislation.

"So it seems to me the motion to suspend the rule should be rejected."

The amendment was defeated last year by a parlimentary move — it probably will be brought up again this year. It's your move.

— F. F. Groseclose

The Time Study Man

With watch in hand at the stroke of eight
He starts on his way to investigate
What new and innocent soul may be
First to be placed in misery.

He saunters up with a knowing look,
Asks questions enough to fill a book,
Then says, "Why is it done that way?"
"That's not required, you'll waste all day."

He picks up parts and walks away
Muttering low as if to say,
"Why can't that fellow use his head?"
"It should be done this way instead."

Over to inspection he goes
To spread his tale of many woes,
And after they sign their lives away,
He's sure he's saved the proverbial day.

And so from figures he didn't get
He sets a rate that can't be met.
He gloats with greater interest yet
When operators start to sweat.

When squawk is raised he'll sometimes come,
But all he'll say is, "Pull out, chum."
And when you're tired enough to scream
He'll say, "Get going, ride the beam."

This verse describes the common view
Of what the Time Study Man is true,
He has a sterner task to do,
But he is always square with you.

This "Dragon Man" is thought to be
A menace to humanity.
But down inside he's bound to be
The same old stuff as you and me.

He eats his Wheaties, sips his tea
Loses his hat and twirls his key
So when this friendless guy you see
Think, "He's doing a job the same as we."

J. S. Wells

Our Large Production

Because of our tremendous production, we own half of the world's electric power, half of the radios, more than half of all the telephones, produce more steel, own 60 per cent of the world's insurance policies and 85 per cent of its automobiles. — *Exchange.*

Organization Control

DON SUNDERLIN
MANAGING PARTNER
SUNDERLIN ORGANIZATION

Introduction

If we make comparison between the work of the butcher, the baker, and the candlestick maker, the differences in technique are obvious and large. But if we compare the bases on which these three activities, as business entities, are built the differences become small indeed.

Design, production, financing and sales being the commonly accepted major functions involved in Manufacturing, modifications only in kind and relative importance occur in the major functions depending upon the nature of the industry. Underlying the activities of every Company however, there is found organization and in this respect they have a common progenitor or basis.

Definition

After vainly searching for a concise definition or organization, the following seems most adequate in expressing the thought: "Organization is the framework within which individuals collaborate in the attainment of a common objective."

Production Handbook states that "organization includes; (1) the persons who man the company, (2) the respective places which they occupy, (3) the range of authority and responsibility which they individually exercise, (4) the framework of relations through one another, and (5) the mechanisms through which they operate and coordinate their activities in the enterprise."

Control of Organization— Essential:

That a sound plan of organization is essential to the success of a business enterprise, needs no comment and it is equally clear that each player on the business team must thoroughly understand his position and what it involves, before he can exert his entire game-winning energies.

It would be needlessly time-consuming to talk to this group about the various kinds of organization. You are familiar with staff and line, the meaning of functions, duties, responsibility, authority, and a logical grouping of functions to achieve the desired result. Let us, therefore, first consider the present status of U. S. companies in this respect and later consider the means by which top management creates and perpetuates a sound organization.

Proper Control Generally Lacking:

Holden, Fish and Smith's study of organization control was based on the experience of 31 nationally known industrial companies. In total, these companies have assets of $8 billion and, normally, they employ 850,000 workers. Industries represented are: Building materials, chemicals, food products, machinery, non-ferrous metals, petroleum products, rubber, and steel fabricating.

It is significant that the authors of "Top Management Organization and Control" found in the course of their study that only a few companies had given the attention to the subject of organization control which they felt the subject warranted. If some of the *best known* companies in the country have been lax in this respect, what must the rest be like? It seems plain that the door to improvement in this field is wide open and size is not a limiting factor. Sound organization is necessary whether the company is the size of General Motors, Thompson Products or Accurate Parts.

Ideal Seldom Reached:

The adoption of the "best" organization plan is something rarely, if ever, seen, for the reason that conditions and personnel are constantly changing. The optimal plan, then, is that which is practicable for the present and the foreseeable future. To maintain its effectiveness requires periodic study to keep it in line with requirements, and regular review to see that it is being properly followed.

Control Functions:

Top management obtains and maintains control over organization planning by a series of procedures and instruments. Time limitations prevent describing all of them, so only the most important have been selected for discussion this evening. The complete ist pertinent to control only includes:

1. Organization Charts.
2. Job Specifications.
3. Procedures.
4. Organization Manual.
5. Initiation and Approval of Organization Changes.
6. Periodic Review of Organization Practice.
7. Training in Organization Principles.

Control Procedure:

Comprehensive organization planning is done by taking the following steps:

1. Keeping up to date with the developments in industrial organization throughout the industry.
2. Testing the soundness of every phase of the existing organization plan from a wholly objective viewpoint. This requires analysis of organization, functions, responsibilities and relationships.
3. Charting the ultimate plan which will most effectively meet the basic requirements of the individual business.
4. Appraising the capabilities of the key personnel in terms of specific jobs.
5. Charting the intermediate plan which represents the maximum distance toward which the ultimate plan can be presently approached.
6. Scheduling the changes to be made with a view toward the least possible disturbance to morale and the effectiveness of the existing organization.
7. Selling the changes to the persons affected.
8. Writing the specifications for each key job, defining and clarifying functions, responsibilities, objectives, limits of authority, and relationships with other parts of the organization.
9. Keeping the organization plan up to date.

This procedure usually develops many opportunities for strengthening and improving the existing organization structure. Some of the common faults we have found in the course of our studies are:

Too many or too few subordinates reporting to an executive.

Overlapping of responsibility and authority.

Improperly channeled executive action.

Incomplete utilization of individual talents.

Unbalance due to underemphasis or overemphasis of basic functions.

Lack of essential checks and balances.

Lack of adequate criteria for measuring executive performance.

Organization Chart:

The foundation of control over organization planning is an organization chart giving a graphic illustration of the structure. The very act of preparing this kind of chart frequently brings to light weaknesses which otherwise would be overlooked or accepted as a necessary evil.

Generally speaking, the process of building an organization structure is one of studying jobs and people *separately* and then matching them to best advantage toward the objectives of payroll economy and smooth teamwork. We start at the top by preparing a written description of each significant job as it exists, and then we reduce it into its components of (1) Responsibility for various duties, (2) Authority over other operations and (3) Its relation to other jobs in the organization. With this information, obtained on a uniform basis from the individuals involved, it is possible to chart the essentials of the present organization which discloses opportunities for improvement in the grouping of functions, arrangement of work, clarification of responsibility and authority and to adopt more accurate job titles.

The principles used in arranging and grouping duties are, separation of line and staff functions, the fundamentals of division of labor, specialization and the provision of proper checks and balances throughout the organization. At this stage it is assumed that qualified people either are on hand or will be found to meet the specifications indicated by the resulting job descriptions. The quality of the eventual organization depends to a great extent on the degree of objectivity applied to this phase of the work.

Since some managements fear that publicizing their organization chart will cause dissension among certain executive personnel, the chart is often treated as a top-drawer secret. To be really effective, all staff and supervisory personnel should have a copy of the chart together with a complete explanation, so that there is no room for the slightest misunderstanding.

Job Specifications:

After the organization structure has been planned, the next step is to define the essential requirements of each committee and key job. This establishes the conditions which, when fulfilled, will result in the maximum contribution by each person to the success of the enterprise. Job specifications and requirements serve the following important purposes:

1. They give each key man a clear conception of his job and its relationship to the organization as a whole. Spelling out just what is expected helps him to work harmoniously with the other members of the team and to concentrate on the attainment of specific objectives.
2. They materially help new appointees by informing them of the requirements of their job.
3. They provide a sound and logical basis for the periodic appraisal and rating of individual competence, in terms of performance on the job.
4. They also serve as an ideal basis for salary evaluation which is an essential procedure even though not directly related to the subject of organization control.

In defining each job and writing its specifications to fulfill these purposes, it is desirable to cover:

Scope — indicating the general extent of jurisdiction over functions and personnel.

General objectives and responsibilities. The responsibilities are supplemented by specific duties.

Relationship to superior and to other units of the organization.

Measurement of incumbent's effectiveness.

Limits of authority.

To those who have had no experience with organization manuals, such an analysis might appear rather formidable. Frankly, it is not a job for the office boy, but the time spent in formulating the plan of organization will be amply repaid through making easier and more effective, the handling of the many matters and problems with which each key man is concerned.

Developing Job Specifications:

The first step in developing such job specifications is, normally, to determine the present practice as to functions, objectives, relationships, and limits of authority for each agency, individual, and key job. From this information the most logical specifications and relationship are worked out to permit each executive to function most advantageously.

Organization Manual:

To facilitate control over the organization aspects of management, to insure that each person concerned has a clear conception of his proper part in the overall picture, and materially to assist in the administration of the plan as sins of omission or commission are encountered, the plan is packaged in the form of a Manual. The ultimate plan of organization, including organization structure and specifications for all key jobs, with changes to be made as opportunity permits, is confidential. Properly indexed, the Manual for *general distribution* includes:

1. A foreword, signed by the chief executive.
   (a) Explaining the purpose of the manual.
   (b) Definitions of terms used.
   (c) Need for cooperation between individuals even though the main channels of their activities have been delimited.
   (d) Date new plan is to become effective.
   (e) Policy regarding enforcement.
2. A set of *organization charts* including in addition to one for the company as a whole, charts for each major division — representing the current, approved organization plan.
3. Approved job specifications describing the functions, responsibilities, objectives, limits of authority, measurement of performance and relationships of each person or organization unit, including general management, divisional management, committees, executives, and key jobs.

The importance of clear and concise expression in the preparation of such a manual cannot be overemphasized.

A comprehensive organization manual is very effective in (a) achieving and maintaining a sound plan of organization; (b) insuring that all concerned have a proper understanding of the general plan and their individual parts and relationships therein; (c) facilitating the study of organization problems; and (d) evaluating the effectiveness of the individual in terms of job performance.

Without careful consideration one might conclude that this grooving of effort stifles initiative but on the contrary a correctly written manual, reflecting a sound structure, actually promotes utilization of this important asset and limits it only to the extent that improperly directed, it would be harmful to the enterprise.

Building the Organization:

Since men are individuals and not standardized automatons, the second step usually is to modify the text book plan of organization so that unusual skills possessed by certain individuals may be utilized. It, of course, is necessary to remain within proper functional limits when this is done or otherwise a new structural weakness will develop.

Building an organization is completed by placing the available people in the re-

vised job arrangement as indicated by their qualifications and previously demonstrated abilities. The outside consultant and the Top Management work together on this, making every effort to accommodate present employes and usually adjusting the lineup of duties to take advantage of desirable people who have unusual combinations of skill or knowledge. Where no properly qualified person is available or in cases where the accommodation of a peculiarly qualified man would seriously injure organization efficiency, a program of replacement is worked out in conjunction with Top Management. As frequently happens when an organization structure is overhauled, there may be a surplus of personnel which permits retaining the better ones and often giving them more stimulating jobs.

Rebuilding:

After the organization structure has been constructed and staffed, there remains the never ending task of improvement. You observed from previous remarks that the designing was done from the top down. Building, or perhaps more accurately, rebuilding is done from the bottom up.

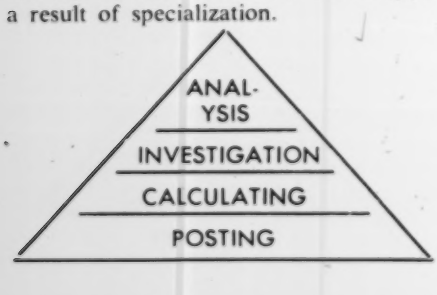
Since it is customary to pay for the highest of the various skills required, there is opportunity for economy through deskilling. To be specific, assume the work of a group of clerks to be; posting, calculating, investigating, and analyzing. Graphically this may be represented by a series of squares each of which corresponds to a person.

1	2	3	4
5	6	7	8

OPERATION	RELATIVE WORTH
Post	1.5
Calculations	2.5
Investigation	3.2
Analysis	4.0

The numbers shown opposite the functions were chosen according to an arbitrary scale to indicate relative importance. Call them cents per hour, if you like.

Rearrangement of the work in pyramidal form results in a figure of lesser area, indicating not only an overall gain, but further and substantial economy as a result of specialization.



Thus organization control which includes constant rebuilding is a never ending job in an enterprise of any size. In the Steel Corporation it is the full time assignment of a number of persons.

SUMMARY

This brief discussion has been intended to point out that control over organization is one of the most vital, though largely unrecognized, needs of management. Furthermore, the need is more or less continuous depending upon the rate of change through personnel, growth, policy changes, etc., of the individual company. Its control, therefore, must be the specific assignment of some individual or agency. The nature of the problem and its manifold aspects require that the responsible person or agency report to the chief executive.

The finest organization structure implemented by properly qualified individuals becomes effective only when properly directed. It is top management's function to direct the organization so that:

(a) The function for which each group is responsible is carried out.

(b) Proper coordination of the various groups is obtained. Too much administrative attention to one activity at the expense of another prevents unified functioning of the whole.

(c) Each individual devotes all his efforts to the work assigned to him and does not become involved in the work assigned to others.

(d) A co-operative spirit and an attitude of loyalty is developed and maintained.

With proper organization, the success of the operation is not assured, of course, but a long step forward has been taken when control has been obtained.

(The foregoing address was delivered before the Cleveland Chapter of the Society for the Advancement of Management by D. H. Sunderlin, managing partner of the Sunderlin Organization, Management Eingineers, Cleveland.)

Painted Machines Safer to Operate

To reduce the number of accidents caused by eye fatigue and labor turnover due to employe boredom, scores of manufacturers are using barrels of varicolored paints in the interior of their plants. One plant found that by painting machines green, walls yellow, and by smearing dashes of orange at strategic points, it reduced by 38% the number of days lost through accidents. Absenteeism fell from 5% to 2%, and labor turnover from 4.5% to 4%. Another company found that painting machines increased production 10 to 12%, and reduced accident rates from $1.21 to 18 cents per man over comparable periods.

Notes From The National Secretary

National Convention

Plans for the 1st annual National Convention are progressing slowly but surely. Proceeding on its position as the oldest chapter of the Institute and its location in a city that is chosen each year as the scene of hundreds of National Conventions, the Columbus Chapter has made the following bid which will be considered at the next meeting of the Board of Trustees:

"Acting on a motion passed at the Columbus Chapter Executive Committee meeting of Jan. 12, 1950, I wish to extend the following invitation to The National Executive Committee:

"'That the Columbus Chapter desires and will be pleased to act as host for the first National Convention, assuming all the necessary responsibility that such action would entail.'

"We would be most gratified to have our offer accepted by the National Organization and will appreciate a reply giving a decision at your earliest convenience."

Regional Vice Presidents

In an area where there are no senior chapters in operation the National Board of Trustees has the responsibility of filling the position of regional vice presidents. The Board is very happy to announce that Prof. Ralph M. Barnes, formerly of Iowa State University, Iowa City, and now professor of engineering and production management at the University of California, Los Angeles, has accepted to permit his election as vice president to the Western United States. All the industrial engineers in the Western States are urged to contact Prof. Barnes with reference to any questions that they may have concerning the AIIE.

St. Louis Chapter

The recently graduated president of the Washington University Student Chapter, Melvin Bierman, whose address is 5830A Westminster Pl., St. Louis 12, Mo., has been contacting AI's in St. Louis for the purpose of forming a St. Louis Chapter. This is of course a very logical development, and all members and prospective members in the St. Louis area are strongly urged to get in touch with Mr. Bierman.

What Industry Expects of a Young Engineer

JOHN B. WOODWARD, JR.
President and General Manager, Newport News Shipbuilding & Dry Dock Co.

This paper was presented at the meeting of the V. P. I. Association for the Advancement of Engineering, Blacksburg, Va., Jan. 14, 1950.

INDUSTRY, IF IT is to survive in the face of ever changing conditions, must maintain design, research, supervisory and executive forces — forces adequate in numbers and adequate in ability to meet any reasonable demand within its particular line of activity. An optimum staff once obtained does not, unfortunately, remain static but is constantly changing as personnel advancements and losses, together with varying load demands, make replacements or additions necessary. It is for these replacements and additions that industry looks to the colleges and universities — and primarily to those which offer engineering training. When you realize that among the newcomers of today will be found the executives of tomorrow, it is easy to understand industry's vital interest in the young engineer and his qualifications. It is equally important, if these qualifications are to be found in the young engineer, that he be made familiar with them during his student years.

It is the purpose of this paper to present and to discuss briefly the principal qualifications for which industry looks. Requirements vary of course in different lines of enginering activity, and many of the qualifications which would appear most desirable for one type of work will not necessarily apply so directly to another. The qualifications expected of a designer will differ from those of a sales engineer, and the requirements for the position of a shop supervisor would not be applicable to research work. There are, however, certain basic qualifications for which every employer looks when considering an applicant for any type of engineering work.

These basic qualifications can be listed under four headings:

1. Good character
2. Satisfactory personality
3. Sufficient training
4. Willingness to work

Possession of good character is so fundamental in any employment, manual labor and jobs of a low order of skill and responsibility perhaps excepted, that discussion of this qualification hardly seems necessary. Obviously no company would employ a young engineer graduate known to be lacking in integrity, loyalty, or conformity to generally accepted moral codes.

The other basic qualifications are also admittedly general in scope; they overlap to some extent and will vary widely in different individuals. A deficiency in one of these latter basic qualifications may often be offset by a more than average measure in another.

I have known men with unattractive personalities or with limited ability who have made good, largely as a result of an over-development of some other faculty, but the market for such individuals is limited. On the other hand, I have never known a successful man who was really allergic to work.

The qualifying words "satisfactory" in connection with personality and "sufficient" in connection with training are not superlatives and are used advisedly. Industry does not limit its employment to those who have demonstrated exceptional athletic or scholastic ability. The desirable engineering graduate has been described as being a "well-rounded-out individual with a good personality, qualified by education and experience to make a good engineer." Let us now consider these qualifications in somewhat more detail.

Personality for our purposes may be defined as the traits, habits, and attitudes which collectively constitute a person. In the young engineer, the employer's interviewer, whether himself an engineer or a trained personnel man, is most likely to give weight to the applicant's *accuracy and thoroughness, ability to get along with others, imagination and initiative.*

The engineering executive seldom finds time to investigate and check in detail the various phases of the many problems which pass over his desk. He must rely largely on the reports and findings of his assistants to guide him in reaching a decision. A careless, inaccurate, or incomplete report may have serious consequences in loss of time and materials, or even in the jeopardizing of human lives. We have difficulty with most young enginers in training them to finish a job, finish it 100 per cent, wrap it up, tie it up and deliver it. Most of them have a tendency to bog down along about the third quarter. The student who makes 90 or 95 per cent on an examination is rated quite highly, but the young engineer who brings back 95 per cent of the information needed either has another trip ahead of him or someone else has to complete the job.

Incidentally, industry is much more interested in the man who will say, "I do not know but I will find out," than in the man who will take a chance and report a satisfactory condition when he is not fully informed. There is no place in the engineering world for the careless, inaccurate individual.

Some years ago an incident came to my attention. A service engineer representing a company which had furnished a piece of machinery for a certain development, turned in to his company a glowing report of the acceptance test. He was correct — the test was most satisfactory and the piece of machinery was accepted, but he failed to state that he had overslept that particular morning, had missed the train, and was not personally present when the machine was operated. The two companies involved later learned the facts and had a hearty laugh over the matter. But the next time a new machine was tested another service engineer was on the job.

Next to accuracy and thoroughness I would place the faculty of getting along with other people. This faculty is not necessarily born in a man. It can be and is often cultivated. It is based primarily on a willingness to see and to take an intelligent interest in the other fellow's side of the story. When the man in the shop calls on the phone to know "why in hell the drawing room hasn't put a certain dimension on a drawing," that man is in trouble, or at least he thinks he is. How much better to look at the situation from his viewpoint and simply tell him where to find the elusive dimension than to suggest that he "get the lead out of his pants and the grease off of his glasses and look for it." Inability to get along with people is not too common but it breaks out in unexpected and embarrassing places. How often have we wished to send an engineer out on a trip to represent the company and hesitated to do so because, in spite of his knowledge of the subject, he does not get along with people. Such a situation is not uncommon and is most unfortunate, particularly as the man with a little effort can overcome this most serious handicap.

One of our young engineers at one time became very much disturbed on account of the editing which his letter memoranda were receiving after they had left his hands and before being forwarded as finished letters. One day while considering the matter the disturbing thought came to him, "Would I be willing to sign my own name to the letters which I am daily preparing for the boss to sign?" His answer was "No." The next letter memorandum was carefully prepared on the basis that the writer

would be willing to sign it were he in the boss's shoes. The boss signed it without change and the trouble was over.

Imagination and initiative are also important qualifications. There is always a need for "wheel horses," men who are reliable workers and will do as and if they are directed, but the supervisors, the superintendents, and the executives are drawn from the ranks of those who can think and plan ahead. One of the first duties of an executive is to train his assistants to carry on in his absence. Industry wants men who have the imagination and initiative, and who can and will accept the responsibility which goes with such training.

Before leaving the subject of personality I would like to mention the following incident. A few years ago we received a letter from a professor at one of our larger engineering universities; he asked, in connection with the placement of one of his students, if we could use a man with a split lip. We replied that we were not particularly interested in the man's lip but asked in return what he had in his head. The reply was satisfactory and we employed the young man. He turned out to have an excellent personality and plenty of ability. The slight impediment in his speech has not hindered him from making good in a big way.

With respect to training, the amount and particularly the type of training required by the young engineer vary considerably with the kind of work which he will be expected to do. There are, however, certain basic qualifications which industry expects to find in the young engineer.

First, he should have a good foundation in the fundamental sciences, physics, chemistry, mathematics, etc. This does not mean that he will be expected to handle the more difficult engineering problems without an opportunity for further research and investigation. He should, however, have a sufficient understanding of the scope of the engineering world into which he is entering to be able to listen intelligently and to know where and how to look for the answer to the problem in hand. In the world of industry the information necessary to handle a particular problem is not handed out in exact amounts on a silver platter; it has to be sought and evaluated.

A professor at one of our engineering schools makes a regular practice during examinations in applied mathematics of presenting problems in which the information supplied is too little, too much, or incorrect. In explanation of this practice he advises that anyone should be able to work a problem when exactly the right amount of data, no more and no less, is at hand, but he wants to know if his students are sufficiently familiar with the subject to find out what is wrong and to ask for the correct information. In other words, do they know how much they do not know? Industry has a great deal more confidence in the young engineer who knows how to find the answer than in the one who feels that he does not have to look for it.

The young engineer who plans a future in the strictly technical or research field should be well versed in advanced mathematics and in those branches of applied mathematics which are used in the particular field he has in mind. On the other hand, design and construction work call for a working knowledge of ordinary mathematics, but there is usually less need for calculus and other branches of higher and applied mathematics.

The average college graduate in engineering seems to lean towards research work, with supervisory work or sales as a second choice, and displays a decided aversion to any form of drafting. He would do well to remember that, with the exception of some possible previous experience, his value at the start is chiefly potential. Engineering in all of its phases involves design, and the two best places to learn practical design are the drawing rooms and the shops. Few graduates wish, or are even able, to spend time in a shop learning the purpose and limitations of the various machine tools. The drafting room offers a special opportunity not only from the purely design viewpoint but also from its contact with the shops. There, the young engineer not only learns to put his ideas on paper but also has the opportunity of seeing them develop through the pattern and machine shop stages to the finished product.

An applicant's previous experience is always of interest to the employer, particularly if it has been obtained in the same line of work he is seeking to enter or in a drawing room or shop. An excellent practice which has been followed by many students is that of obtaining employment during the summer vacations in a drawing room or machine shop. A grasp of drawing room and shop practice can be obtained in this way in a short time which will be of real value to the student both during his college years and after graduating.

The third requirement or qualification, willingness to work, requires little explanation. The average young engineer is not physically lazy, but when it comes to mental activity — the willingness to think things out to a conclusion — there is often room for improvement. I have in mind a situation which arose not too long ago where a man was needed to fill a supervisory position. We had the man, with the necessary experience and ability. We led him up to the trough and we nearly drowned him, but we couldn't make him drink. He had, probably unconsciously, placed a limit on the amount of thinking he was willing to do, and when we loaded him up beyond that rather moderate limit he would simply stay home for a couple of days. He is still occupying a minor position.

In recent years a number of surveys have been made by various authoritative groups to determine just what are the bases on which engineering employees are selected. It is most interesting to note that personality heads the list, with ability to get along with others close to the top. These surveys have also indicated certain deficiencies which employers find in the young engineer. Some of the more frequently reported are:

Inarticulateness in expression and writing
Lack of drafting and design experience
Lack of business knowledge
Insufficient knowledge of shop practice
Insufficient knowledge of materials
Lack of interest in civic affairs

There is another extremely important qualification which I have not listed, as it is quite difficult to detect the undeveloped faculty in the applicant for employment. It often becomes apparent quite early in the career of the young engineer, and still more often is poorly developed in men of considerable experience. I am referring to analytical ability. Crudely expressed it is the ability to separate the big items from the little ones. In other words, it is the ability to properly evaluate the different factors or components which enter into a particular problem so that proper emphasis can be placed where it is needed. We often hear of a man being "swamped with details" or "that he cannot see the woods for the trees." It is all the same failing, and it results in time and energy being wasted on non-essential items at the expense of the important ones. One mark of a successful executive is his almost uncanny ability to put his finger on the important item, or on the sore spot, to the complete exclusion of the multitude of obscuring details.

Ambitious young engineers at times are apt to worry for fear that their particular abilities are not being recognized. I can assure them, from observation and experience in working with professional men over a considerable period of years, that the minute a particular head sticks up above the rest of the group the boss will know it and will do something about it at the first opportunity.

I would like to leave with you this thought — engineers are made and not born and industry is always looking for the men who have the "makings." There is an old saying to the effect that there

is always room at the top. That is just as true today as it always has been, but it is amazing and disturbing how difficult it is to find a really qualified man when a position of authority and responsibility unexpectedly develops.

There is one concluding comment which I would like to make. Those of you who may enter Government service are likely to be confronted with some form of "loyalty test" to make sure that you would not be a potentially subversive or destructive member of the group. I know of no such test applied to young engineers who seek connections with industry, but it would seem wise for such young men before starting their careers to acquaint themselves with the American system of private enterprise. The fact that you have an understanding of this system might weigh heavily in your favor with your prospective employer. I will not attempt to tell you where knowledge of this kind can be found but the sources are numerous and the honest seeker can easily find the truth.

I should like also to pass on to you this quotation from an article by Charles E. Wilson, the President of the General Electric Company in the December 1949 number of the General Electric Review. Mr. Wilson makes this statement with respect to American industry:

"It is labor, it is management, it is research and engineering, it is investment, and it is sales. To some degree it is just about everybody you know — and not just a small, selfish, rich and aged group of Republicans.

"For every one of us who believes that what happens to America — and therefore to the world — must be a direct result of the efficiency and productiveness and leadership of our own competitive economy, the hard and constant fight consists of this day-by-day campaign to teach our people that industry is not a political party, that it is not a special interest, that it is not an antisocial force. Rather it is the organized striving of millions of our fellow citizens, the harnessing of their brainpower and their labor, the mustering of their needs and desires, the enrollment of their ambition and their accountability, to the end that they will be better fed, better housed, better secured against disaster, better informed, and inspired by a true respect for their own powers and their own dignity."

Who Wants to Dig With a Spoon?

Two workingmen watched a steam-shovel handling great chunks of earth at each bite.

"If it wasn't for that scoop, 500 of us might be working," said one.

"If it wasn't for our shovels, a million of us might be working with spoons," the other retorted. — *Exchange*

Students at Georgia Tech Open New Lounge

The student chapter of AIIE at Georgia Institute of Technology continues to be one of the most active on the campus.

During the first part of September the student lounge (pictured above) for the school of industrial engineering was opened. This well furnished lounge was made possible by the enthusiastic efforts of a student AIIE committee headed by Jeff Macon. Donations by industrial engineering students, gifts from local business organizations and from the institute made up the major part of the fund. Several of the student's wives gave their time to make drapes. Col. Frank Groseclose, Director of the School of Industrial Engineering donated a large radio to complete the furnishings.

Chapters Stage Panel Meetings

J. L. SOUTHERN

Secretary, Columbus, O., Chapter AIIE

As a special project of the current season, in addition to the regularly planned program, the Columbus Chapter of AIIE has undertaken participation in a series of educational panel discussion meetings in conjunction with the local chapters of The Society for Advancement of Management (SAM), and American Society for Quality Control (ASQC); with each group sponsoring one of the three planned meetings.

Through these joint sessions it is hoped to create added interest of the membership and also to present a more varied, beneficial and comprehensive program. At the present writing two of these meetings have been held with the third scheduled for Feb. 2, 1950.

The first program, entitled "Cost Reduction Through Scientific Management," sponsored by SAM was held Nov. 7, 1949. The panel included F. R. Coumbe, Plant Manager, Owens-Corning Fiberglas Corp., Newark; J. F. Cunningham, Jr., Works Manager, International Derrick & Equip. Co., Columbus; Ralph C. Davis, Professor Industrial Management, Ohio State University; E. D. Walker, Superintendent, Ceramic Division, Lustron Corp., Columbus; W. L. Werner, Cost Manager, The Anchor Hocking Glass Corp., Lancaster, and W. M. Keller, Production Manager, Owens-Corning Fiberglas Corp., Newark, who acted as moderator.

The second program, entitled "A Tailor-Made Materials Handling Program," sponsored by AIIE was held Dec. 1, 1949. The panel included John Shea, General Superintendent of F & R Lazarus Co., Columbus; Richard M: Hardin, Plant Industrial Engineer for the Columbus Plant of the Omar Baking Co.; Dwight D. Gardner, Vice President of Commercial Motor Freight, Inc., Columbus, and National President of AIIE; John W. Brantner, Industrial Engineer with the Jeffrey Mf'g. Co., Columbus, and Prof. W. G. Stanton, Head of the Management Division of The Industrial Engineering Department at Ohio State University who acted as moderator.

The third program of the series will be entitled "Quality Control Methods Versus Regular Inspection Methods" and will be sponsored by ASQC. Their complete program and speakers' panel have not yet been announced.

Engineering Office Operations

ALEXANDER M. GOW, E.M.

QUITE OFTEN WE HEAR and are inclined to believe that the frontiers of opportunity faded with the last generation: pioneering is past, the mines have all been prospected and industrial expansion has submerged the chances for individual enterprise, regimentation is unavoidable and we may aspire only to becoming cogs in the modern social machine! Such a defeatest attitude is incompatible with human instincts and with engineering principles; and while, of course, such a position is untenable, the prevalence of the belief makes any field of endeavor the more attractive which offers an opportunity for expressing the creative urge and for applying profitably those principles which were applied so successfully in the "good old days."

Such a field is to be found for the engineer in a branch of the profession which, popularly, is not thought of as being "engineering": the application of engineering principles and thinking to office management and white collar operations.

When waterpower is to be converted into electricity, when automobile bodies are to be fabricated from sheet metal, or when gears and levers are to be assembled into machinery, one without questioning accepts these as engineering problems. However, when the matter under consideration is the conversion of brain-power into procedure, the fabrication of sheet paper into documentation, or the assembly of people into white-collar production teams, one may not so readily recognize that the problems are fundamentally the same although the tools are different.

In its broadest sense a tool is any object which is used to facilitate an operation; and a human being, in many cases, is as much a tool as is a monkeywrench. The messenger boy, functionally, resembles a conveyor belt; an accountant, adding a column of figures in his head, is analogous to a calculator; and a draftsman often substitutes his own skill for that of a drafting machine. This does not mean that men should or may be considered as intermittent conveyors, as tapeless calculators, or merely as drafting machines. Economically, as well as morally, men are not chattels. They are more complicated, more versatile, and often more confusing than any inanimate device; but they are the chief tools, as well as the operators, of white-collar production enterprizes.

Good management consists of the proper procurement and efficient use of these human tools, while ever mindful of the fact that they are intelligent creatures of dignity and free will.

ALEXANDER M. GOW

After more than 15 years in teaching and research experience following his graduation from the University of Minnesota in 1923, Mr. Gow switched over to Industrial Engineering. He started the procedures section of the Industrial Engineering Department of the North American Aviation Inc. of Kansas. He later became the staff assistant to the plant manager. At the end of the war he returned to U. S. Corps of Engineers and has worked on their problems of administration. He is author of several technical publications.

It is the purpose of this article to outline the problems and the more important phases of office management and white-collar operations, using the engineering approach and analogy.

Top Management & Policy

Whether the establishment is a small grocery store, a metropolitan commercial establishment, or a government agency, it starts with a top management decision as to purpose and policy. This statement and its development are inane when applied to the simple case: "The owner of the grocery store must first of all determine that the prime mission of his enterprise is the merchandising of groceries!" However, when a Board of Directors, circumscribed by papers of incorporation, or a governmental Agency carrying out the provisions of a legislative act embark on a program, there may be many complicated phases to the preliminary planning and the simple statement regarding the purpose and policy is not so absurd.

In principle, it matters little whether the processes involved in the "execution of the mission" are those of merchandising, manufacturing or management: someone first determines the general "what, how, where and when" of the undertaking, and thereafter, local management and supervision assume the responsibility for operations under established policy. The dividing lines between "top-management" and local or specific management, between policy and procedure and even between supervision and supervised may be indistinct. In general, the distinctions are more apparent as the operation and organization increase in magnitude and complexity.

The functions of management may be summarized into (1) policy, (2) organization, and (3) methods, with the latter subdivided into (a) procedure, and (b) operational analysis. These are the functions of office management and industrial management alike. The flow of ore through a concentrator and the flow of documents through the payroll department, or of logs through a paper mill depend on the same managerial principles, whether it is called industrial engineering, business management, or by any other name.

Policy may be defined as the system of management, and the decisions which constitute the determination of policy are often reserved for top-management, by definition. However, this concept may be misleading as policy determinations, commensurate with the responsibility of a position are inherent in nearly every white-collar job, even though they are not dignified by the term, "policy." It is the product of judgment and is arbitrarily established so far as operations are concerned. Whether the accounting will be done manually, or by bookkeeping machines, or by electric accounting machines; and whether the employees will be bound by "shop rules," time clocks, and what they might consider regimentation, or whether they will be under an honor system based on company tradition, employee loyalty and good supervision, typify subjects for top-management policy determinations. Likewise the question of departmental budgeting of office supplies versus the free-stock system, the degree of control over correspondence, the adoption of incentive programs are matters subject to decision before operational procedures may be prepared. The policy making body is often guided in its decision by the consultation of staff groups or operating personnel and may even delegate certain of its responsibilities, but in all cases it is responsible for those broad determinations under which operations are worked out, proceed, and are improved.

Organization

Organization is the architecture of an establishment. It considers the human components, their respective functions, their groupings and their structural relationships. Being human, it has intelligence; and if it were possible for an establishment to have perfect organization, it would function perfectly because each person would know and carry out his relative and cooperative responsibility. A team of such persons would function without fumbles or errors and even without signals. Unfortunately we are all human and this idealogy merely represents a concept which we strive to approach through the use of organizational

techniques, the chief of which is supervision.

A supervisor is a person who coordinates the efforts of a number of other persons so that they will perform their duties with a minimum of errors. He may be a playing manager or a bench manager, but the thing that makes him a supervisor and the head of an element of the organization is his exercise of some measure of administrative authority.

Administrative authority may be defined as the right and responsibility to hire, fire, transfer and promote, or recommend such actions; to arrange and approve leave, overtime, and work schedules; to make decisions commensurate with his position; to instruct and direct the work of subordinates and pass judgment on their efficiency; and to assume the consequences for the accomplishments of the element.

A good supervisor should be versed in the general principles of management and the specific activities of his particular element, but, above all, he should know the capacity and operational characteristics of every human tool in his shop.

An organizational structure which is based on direct supervision and the exercise of administrative authority over persons, or supervisors in charge of organizational elements, is generally referred to as line organization. The popular example is found in the armed services, and it is often represented by heavy line on organizational charts.

Whenever an official is unable to exercise, personally, all of the administrative authority vested in his office, it may become necessary to expand the organization by adding personnel or even elements to furnish the needed assistance. Such supporting persons or elements are "staff" to the principal carrying out such special assignments and exercising such of the principal's administrative authority as may be delegated to them. Staff organization is usually charted by light lines.

Again, when the complexities of operation demand the services of specialists or technicians, a third type of organization, functional organization, becomes necessary. It implies the use of consulting and instruction services. With the sanction of higher line supervision, it exercises necessary administrative authority by delegation, but only within the scope of its specialty; and it can tie into line organization at any level. Functional relationships are conventionally charted by broken lines.

The organizational pattern depends primarily on the number of employees, and secondarily on the functions involved. Like functions should be grouped together but a small employment can justify only a simple structure regardless of the multiplicity of activities. Once the organizational policy is established, the organizational Manual can be prepared.

A complete organizational manual consists of four parts: (1) Introduction or General Section, (2) Organization Chart or Table of Elements, (3) Functional Statements, and (4) Staffing Pattern or position Charts.

The introduction should cover the principles enumerated above; the responsibilities common to all supervisors; the organizational levels, such as, "Office, Division, Branch, Section, Group;" and the method of controlling and revising the organization.

The Organizational Chart should show the line, staff, and functional organization with separate blocks for each element, showing its title, code number, and supervisor, and arranged to show the subdivision of larger elements into their components. Obviously, no element should be subdivided into less than two parts; nor can satisfactory supervision be given to an excessive number of components. When a Table of Elements is used in place of a chart, the subsidiary elements may be shown by relative indentations.

Functional statements for each element should enumerate all the important responsibilities and activities of the element. These statements should be brief, but not so generalized as to be vague or ambiguous. In the event of a subsequent question of overlapping duties between elements, or the discovery of an apparently unassigned responsibility, the functional statements should clarify the problem. Furthermore, these lists serve as master plan for the development of departmental instructions, job descriptions, and should be coordinated with published procedures.

The position chart or staffing pattern, lists the several jobs or positions under the immediate supervision of each element head. It should show at least the position titles and grades and the number of each. The position chart is the control or the individual job sheets and such personnel records as are maintained by the respective supervisors.

Procedures

Procedures are the blueprints of the white-collar production, and the complements of organization. Just as perfect organization would permit operations without instruction or guidance, so perfect procedural development would obviate the need for organization. Since neither is practicable, top management must establish a policy which utilizes both organization and procedures, considering the particular circumstances.

When an establishment is small or when the personnel have "grown-up" with the job, procedure is a matter of personal experience: the know-how is inherent or traditional; but with expansion the employment of new personnel, or changes in operating methods it often becomes necessary to formalize the procedure. The same factors which justify the organizational manual, justify the procedural manual. In the broadest aspect, procedures include all instructions pertinent to operations, but as in the issuance of construction blueprints or job tickets, it is necessary to go only so far, leaving the ultimate detail to established standards, shop practice or immediate supervision. So in procedures, the basic step is the policy determination of the types of procedural releases which will be utilized, the authority and scope of each type, and the method of controlling the issuance, distribution and observance of the several types of series. Separate series should be established for: (1) statements of policy, contractual requirements or legal provisions which govern the overall operation; (2) primary directives which prescribe or revise the methods to be used in executing broad phases of the mission, or which are binding on persons in more than one department and are applicable for an indefinite period of time; (3) instructions dealing with operations confined to one department and being of no concern to other departments; (4) notices, announcements and informational releases of a transitory nature. The issuance of these, with the possible exception of the departmental ones, should be centrally controlled. Important factors in the control are (1) assignment to the proper series and numbering, (2) assurance of proper prepublication clearance with operating officials concerned and against policy and outstanding directions, (3) editorial review for form, style, subject matter and possible ambiguity, (4) distribution and follow-up, and (5) cross-indexing and maintenance of the master file. Such a control over engineering blueprints in industry is a recognized necessity, but in the business world it is sometimes considered "red tape."

Closely allied to procedures control is form control. Many procedures may be established through the use of properly designed form, with or without instructions printed thereon, and since forms constitute the largest group of white-collar tools other than equipment items, a system of controlling them will often serve as the greatest single control of operations.

In any procedures control operation, a thoroughly cross-indexed library is essential, with an inactive section for historical reference to those procedures which at one time governed operations. Without a means of rescinding obsolete material and avoiding duplications in subject matter, the procedure manual will become too cumbersome and complex to be useful. Authorizations and dele-

gations, which are neither organization nor procedure, but have an important effect on each, should be indexed in the procedures library.

Procedure Writing

Much has been said about the art of writing — just as much has been said about industrial design — and the matter of "style" has been bantered from the functional to the aesthetic, with the erroneous implication that that which is fine, cultured and aesthetic is incompatible with the practical, stern, mundane realities of science and business. Procedure writing is a form of technical writing in that it must convey a positive message in an understandable and unequivocal manner for a practicable purpose.

Those releases which give orders, direct specific actions, provide instructions for processes, standardize practices, or show the flow of documents and materials are issued to effect the transition of policy into product and complement the organizational manual. They should be written in the imperative mode, or at least with the implication of demand. They comprise the "How Book," the "Bible" or the Procedure Manual. Unauthorized deviation is forbidden, and interpretation should be unnecessary.

Other releases, which are of a transitory nature such as announcements, information circulars, and morale building messages may be equally as official as procedures proper, but they should not be confused with those of a directive nature.

To prevent confusion, and primarily, to render the several releases readily understandable and useful, certain standards should be incorporated into the initial planning of the procedural releases and manual. A means (or department) for effecting central control over releases and assuring their coordination and authenticity, the types or series under which release will be issued and the major subjects — chapters in the procedure manual — should be established. A standardized format, editoral outline and method of duplication and distribution add to the effectiveness. Even a color scheme or code for releases on various phases can be good shop practice.

A very effective presentation of a procedure which involves the flow of paper is found in the technique long used in engineering, of a pictorial flow chart. Such a diagram provides areas for the several departments or work stations and shows the movement and stops of the documents and copies thereof. Since the question is more frequently, who makes out a form or to whom are the copies sent, rather than how is the form filled in, a pictorial flow chart with footnotes describing the operations is more useful than the more lengthy, narrative procedures, of utilizing process charts and of combining flow charts with narrative procedures, of utilizing process charts and of correlating procedures with operational instructions and position descriptions, should be kept in mind.

Operational control involves first an analysis of what is happening, in investigation of possibilities for improvement and, lastly, keeping the machinery running under the established or reestablished procedures. The profit and loss sheet may tell what is happening, unless it only reflects what did happen after it's too late. Operating reports and statistics when effectively used can be the gauges which measure efficiency, progress and output. When they are not used properly by operating and policy officials they may be only historical extravagances. Management surveys, work simplification, staff discussions and the practical ideas from an employee suggestion system can furnish the basis for improvements. Employee relation programs, incentive plans, morale-building house organs, and wise personnel management will keep the human tools and machinery running smoothly and in production.

Reports and Statistics

It is very easy to ask questions; and it is fascinating to "develop statistics." As a consequence, there is often a tendency for the statistical activity to expand out of proportion to its usefulness. On the other hand, it may be cheaper to accumulate a few extra facts as a by-product of production than have to reconstruct them through research at a later date if the need develops. Performance data and trends may be of great value in controlling and planning primary operations. Other data, of no immediate or local significance may be required by higher authority. Recurring reports, like continuous recording gauges, are the logical source of many statistics, but should be held to a minimum as should all other demands which might tend to detract from production. Special, one-time reports and the use of sampling techniques may prove more economical. Here, as in the case of many other refinements, the law of diminishing returns governs the extent to which it is practical to carry the activity.

In the development of statistics two points should be borne in mind, the significance of the statistic and the use to which it will be placed. The best of statistical analyses and presentations, if they are not put to use, are commercially valueless; and to attempt to utilize information of negative significance is futile. The problem is similar to that of tool design, and no tool designer would develop an expensive tool without first knowing why and how and by whom it would be used.

Methods Studies

There is always a better way. Hackneied as is this statement, it is as applicable in the office "paper mill" as it is in the industrial paper mill. The techniques of discovering the better ways, of analyzing the methods which are subject to improvement, are too numerous and complicated to be discussed here. Many of them are well known to every engineer who "thinks with a pencil," even though their application to white-collar operations may seem an innovation. One need only attempt to make a process-flow chart of the preparation of a multi-copy business form with supporting documentation, to see why there is some reluctance to apply engineering to office procedure. Equally impressive is the development of a cost accounting system for the products of most white-collar enterprises. Yet, the very complexities which such studies reveal, indicate the opportunity for work simplification and increased efficiency.

Many office processes are amendable to time study and work-load analysis; and this is especially true as the individuals performing these processes functionally approach mechanical tools. But even these human tools, being human, are possessed of intelligence, and any analysis should be modified from its purely impersonal aspect by taking advantage of the inherent intelligence not found in the purely mechanical counterpart. This new factor in the otherwise conventional engineering technique may be considered as belonging to the employee relations activity; but it is poor management to believe that the two may be divorced.

Employee Relations

No machine is expected to operate satisfactorily without maintenance: tools must be sharpened, lubricated, cooled and repaired, and in some instances fatigue strains must be relieved. Likewise human tools must be maintained. True, the techniques are different! A machine tool can't tell us where it hurts, and if it is inclined to be tempermental we, unfortunately, have no way of predetermining that fact. Industrial equipment can't make suggestions to improve its own efficiency; but it can be driven unmercifully to the point of break down, with no greater damage than the cost of replacement. The parallel between the inanimate tool and the human tool is limited as already pointed out and as is unquestionably obvious.

The engineering concept, however, of office management, based as it is, on the purpose, the product, the raw materials, the tools, and the methods of the operation, can no more ignore the factor of employee relations than it can ignore the factor of maintenance in purely mechanical operations.

Thus, Engineering still may be considered as the "three-dimensional science," even when it comes in out of the rain and weather.

Notes From The President's Desk

Finances

It has occurred to me that many of our members naturally may have questioned from time to time about the finances of the Institute. Arrangements have been made with Keller-Kirschner-Martin & Clinger, certified public accountants of Columbus to audit the records and prepare a certified statement during the latter part of March. Such statement will be published in the next issue of the Journal. It is impossible to have it ready for this issue because the accounting firms are loaded between now and March 15th with the preparation of statements for stockholders' meetings of business corporations and tax returns.

For your information the system has been followed of deposit all receipts in an insured bank account to be withdrawn by the treasurer in payment of the approved expenses of the Institute. As of February 13th the balance on deposit was $1261.04 with a deposit of $304.05 in transit. The public statement will show a summarization of the expenses and the sources of revenue. The office of your Institute has been managed to make a maximum utilization of part-time student help and otherwise minimized expenses to assure adaquate funds for the continued development of the Journal and other objectives of the Institute.

Professional Registration

When the AMERICAN INSTITUTE was founded it was decided not to make professional registration with a State Board of Engineering registration mandatory for membership, but to encourage all IE's to seek registration. This was done because it was recognized that the large majority of men in our branch of the engineering profession are employed in factories and other organizations where there is less reason to be aware of the trend toward registration of engineers, than in public works engineering offices and similar establishments.

Instead, the policy was adopted of accepting registration as prima facie evidence of eligibility to belong to our organization. It is feared by some of the older members, however, that there is insufficient interest in registration on the part of the IE's. Within the confines of our own meetings and in a private publication such as this, it can be said that hardly any other branch has so much to gain by actively pushing the registration program. There are still many quarters in which it is contended that IE is not properly an engineering branch at all, and in fact there are some states wherein it is difficult, if not impossible, to obtain registration as an IE.

Nothing will contribute so handsomely to a public recognition of the importance of IE as for a large majority of the members to attain registration. There are powerful forces at work trying to limit registration to men who actually design bridges and other structures "directly affecting human life and safety". At least part of this opposition to registration of all engineers who are engaged in true professional work, stems from the fear of certain employers that when engineers understand their own position as members of an honored and ancient profession, it will no longer be possible to hire them for picayune salaries as is still too often the case.

Every chapter, both senior and student, should take an active interest in this problem and make every effort to increase the number of registered IE's. The logical thing is for all graduating seniors to take the exams as soon as they are eligible to do so. Men who have gotten out in employment without starting on their registration should also be encouraged in this direction and every chapter should make an effort to operate refresher courses to aid those who are to take the exams.

Many hesitate to take these exams for fear of displaying their ignorance. A proper environment can be established in chapters in which it will be clearly understood that the exams necessarily contain basic mathematics and other material which men out in practice do not use daily and therefore become rusty in handling. Thus it can be established that it is no disgrace to fail on the first attempt, but a mutual effort to brush up can be encouraged. On the other hand, in certain quarters exams have contained unreasonable questions, but a chapter operating as a chapter in cooperation with the national organization can take steps to persuade the authorities to correct such situations. Very often they are caused only by lack of understanding of what the IE's work really is.

Home Furnishing Cost Is Lowered

Young husbands furnishing homes get more for an hour's wages than their fathers could have 35 years ago, according to the National Industrial Conference Board. The board reports that 82 hours of work meet the annual house-furnishings bill of today's moderate-income family, while 95 hours of work had to be expended in 1914.

Machines Doing 92% of Work

In 1850, men accounted for 15% of farm-labor energy; animals contributed 79%; and machines only 6%. Now machines do an estimated 92% of the work; animals and men each account for only 4%. A century ago, the man-animal-machine farm team turned out 27 cents worth of produce in an hour. At today's prices its hourly output is valued at $1.41.

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Book Reviews

Applied Experimental Psychology

(Human Factors in Engineering Design)

by A. Chapanis, W. R. Gurner, and C. T. Morgan, John Wiley & Sons, New York, 1949. 439 pages.

Reviewed by Professor Robert T. Livingston, Head, Department of Industrial Engineering and Management, Columbia University.

Formal engineering machine design has passed through two distinct phases and is now entering a third. The design of a product or machine for strength, environmental limitations and performance goes back many years. Along about the time of the first world war there was a revolution in machine design; products were redesigned for production economies. Now we are entering the field of redesign for adaptation to the human being. Most people are familiar with so-called "Industrial Design" or "functional design" which, however, named, is largely a matter of redesign for eye appeal. However, the newest trend is far more than that.

A glaring lack in modern technology is in the design and adaptation of machines for the facilities and senses of man. Man has certain sensatory abilities and limitations and perceptions. Accuracy and speed of recognition and response are dependent upon the inclusion in the design of the machine, a recognition of man's perceptual faculties and his ability to translate these into responses.

This book is an important one for industrial engineers and especially those who are interested in design. Here for the first time is collected the available material in this important field. Much of what is here presented was previously "known" but the mistakes of the war and the growing complexity of the machines of war made test and proof of this knowledge necessary.

The field stems from two areas of industrial engineering: (1) time and motion study and job simplification and (2) personnel and applied psychology. Man's senses and faculties are studied and the use of the particular sense or faculty in relation to response is presented. Sight, hearing and sensatory recognition are presented and discussed especially in respect to man's ability to receive and recognize a stimulus and to properly respond.

The last few chapters of the book have to do with work and the work place and general environment and man's physiological as well as psychological reactions.

This is an interesting and valuable book and one more recognition that the worker has more than merely physical and economic needs.

Administrative Reflections of World War II

by Luther Gulick, The University of Alabama Press at University, Alabama, 1948. 139 pages.

Reviewed by Professor D. B. Hertz, Department of Industrial Engineering and Management, Columbia University.

This book attempts to encompass the broad experience of Dr. Gulick in dealing with the many serious administrative problems which arose in gearing this country's economy for global war and reconstructing the economy for peace time production during the period from 1939 to 1946. Professor Gulick is well qualified for the task, having been an outstanding authority on administration prior to the War, and having served in establishing the organizations and programs of numerous agencies, including the Control division of the War Department, the War Production Board, the Office of Organizational Planning, the Office of the Co-Ordinator for Inter-American Affairs, and others.

"Things happen fast in time of war. Men act along new lines boldly, decision jostling decision. Mistakes are made, and new approaches are sudden and frequent. This environment creates a situation which is extraordinarily fertile in institutional experimentation. If it is equally productive in demonstrating what will and will not work in peacetime administration, careful attention to our war experience may prove extremely rewarding for those whose prime consideration is found in the challenging problems of peace." Based on this premise, the book outlines a broad picture of administrative difficulties, accomplishments, and deficiencies which are clearly and logically drawn. In a remarkably short compass the lectures, from which this book has been drawn, present for the serious student of administration, as well as active administrators in any field, important lessons and conclusions which will add to the growing body of knowledge in this area.

Beginning with a panoramic sketch of the war years, the book proceeds to list the multitude of resources which were required to be coordinated in order to be effectively utilized. If the book is to be criticized, it would be on the ground that the background material presented is too meagre (for any but the most experienced in the myriad of wartime administrative agencies) for a proper understanding of the developments. As Mr. Gulick says, in the same vein as such writers as Gillispie, Follett, and Livingston, "administrative developments, cannot be understood unless they are related (1) to their own organic past, and (2) to the compulsions of the environment in which they exist." It is too much to expect that both the past histories and then-existing compulsions would be outlined in detail in this small volume.

In discussing the background of the development of the war machine Gulick shows clearly that the common drive and environment gave rise to a more or less similar rythym of growth and adaptation in the various administrative agencies. The clear cut time factor points out that there may be a need for studies of such time elements in the field of organizational evolution.

With this background, the book turns to an outline of achievements and failures. Here we see that Dr. Gulick considers the general staff concept as a most important advance when applied to other than military organizations. With reference to failures, the important ones in Gulick's consideration were lack of proper and sufficient intelligence on the top level, and lack of comprehensive planning for what is clearly the basic resourse — manpower. The intimation that we must prepare a comprehensive manpower budget for both peace and war is a serious challenge to the industrial engineer. The complexities of such a master-plan are very great indeed, and the industrial engineer must accept the challenge to study the theory of such metrical formulations of policy in the future.

The last section of the book concerns itself with general and specific lessons to which students of administration may devote their attention. These lessons are of considerable interest, and are a concise presentation of administrative operations. The book closes with a clear cut, hard-headed outline or reasons for democratic superiority in administrative operations, which alone would be of great value in all of us. The book itself should be read by all those concerned with the theory and practise of administration, and it is only regrettable that it has not been expanded into a more complete work.

Dynamic Equipment Policy

by George Terborgh, Research Director, Machinery and Allied Products Institute, McGraw-Hill Book Co.

Reviewed by Professor Donald B. Wilcox, School of Industrial Engineering, Georgia Institute of Technology.

This book is an important contribution to an intensely important field of management decision and policy which has been woefully devoid of investi-

gation and authoritative, organized, constructive thinking. Proceeding from the known and admitted to the unknown and debatable, from the simple to the more complex, the author develops a most logical philosophy relative to problems of equipment analysis and investment.

This book is not easy reading but the subject matter is skillfully embellished with discerning diction. Illustrative problem situations have been kept to the barest minimum and in their place the reader is presented with two standard assumptions: (1) That future challengers (replacement possibilities) will repeat the adverse minimum of the present one, and (2) That the present challenger will accumulate operating inferiority at a constant rate. These assumptions are then applied to a variety of tests, in some cases with devastatingly critical comments as to current practises encountered in industrial plants.

The chapter on Problems of Estimation offers many helpful suggestions, as does the discussion of the topic of Interest Rate to be used in replacement studies. Fallacies encountered in arbitrary selection of Short-Pay-Off or Rate-of-Return requirements are examined and explained. In conclusion the author presents a sincere appeal for the adoption of his title topic, a Dynamic Equipment Policy, which will be both realistic and helpful.

This volume should appeal to anyone having to do with the formation of company policies relative to the selection of and investment in new or replacement equipment or facilities of any type. Plant managers will want their engineers to be conversant with the ideas expressed and superintendents will want to send their top executives a copy. It is a stimulating discussion of a live and vital topic with enough new and original concepts and thought provoking ideas to nudge the intellectual wheels of even the most complacent manager.

Recommended for Reading

"Keeping Stock Records of 36,000 Items Without Files" E. H. Titmus, Jr., General Manager, Titmus Optical Co., Inc., Petersburg, Va., *Factory*, November, 1949.

"Using Standard Data to Teach Time Study," J. N. Crone, Industrial Engineer, Penn Electric Switch Co., Goshen, Ind., *Factory*, September, 1949.

"Trends in Industry-Wide Bargaining," H. S. Hall, Director, Personnel Administration, Bigelow-Sanford Carpet Co., New York, N. Y., *Mechanical Engineering*, December, 1949.

"How Many Readings for a Time Study?," M. E. Mundel, Professor of Industrial Engineering, Purdue University, Lafayette, Ind., *Advanced Management*, 1949.

"Britain's Production Incentive Undermined by Socialist Planning," C. C. Harrington, Editor, *Mill and Factory*, December, 1949.

Atlanta Officers

Photographed at a recent dinner meeting of the Atlantic AIIE Chapter, the above officers are, left to right, (front) President, Prof. C. B. Foos, Georgia Tech; Vice President, Charles Bastedo, Industrial Engineer, Atlantic Steel Co.; (back) Secretary, Frank Taylor, Industrial Engineer, Cluett-Peabody, Inc.; Treasurer, Bob Eskew, Assistant Director, Georgia Tech Evening School.

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A single contact control provides instantaneous stapling of articles upon insertion into the Staplex automatic electric stapling machine. No waiting for "making and breaking" of electrical circuit is necessary.

The Stapling operation is entirely automatic. When articles to be stapled are inserted into the machine, contact is made and stapling is completed automatically. Operation is not dependent upon any timing by the operator.

Incorporated in the single contact control is a special construction to prevent repetition of stapling in the same position.

Another feature allows full regulated adjustment for entire depth of machine. A calibrated scale on the machine guides user in selecting proper stapling position. Turning control knob and moving forward or backward provides a simple and quick adjustment.

The flexibility of the machine allows unlimited use of articles to be stapled with utmost efficiency.

A standard staple is used, with a front feed. Reloading is quick — nothing to remove. Staples are fed through the front opening of machine.

Modernistically designed cast dural housing embodies entire machine. All moving parts are concealed. The machine does not have to be fastened. Rubber cushioned cups at base of housing allow it to be used everywhere. The Staplex automatic electric stapling machine is manufactured by the Staplex Company, 62-68 Jay St., Brooklyn 20, N. Y.

SCREWSTICK CUTS TIME

Screwstick is a one-piece stick of identical precision screws, each joined to its neighbor. Screwsticks load in a jiffy. Merely insert a screwstick into the pneumatic, electric, spiral, or hand-ratchet driver and the entire stick of screws will feed automatically.

Screwstick combines simplicity and speed of fastening with rivet-like strength, eliminates fumbling and tedious handling of individual screws regardless of size and insures alignment between screw and threaded hole. It eliminates any need for special skill in driving. It's "good-bye" too, to operator fatigue and eye-strain. Fastening efficiency zooms upward because neither operator nor driver speed determines tightness. Each screw contributes its full share of holding power.

Screws are twisted off automatically and the fastening is made when a predetermined torque is applied by the screwdriver to the screw following the

one driven. The amount of torque is controlled by cross sectional area of neck joining the screws. The neck can be varied to your requirements. The head of driven screw is burnished smooth by the next screw to be driven. As the tightened screw is freed from the neck, the next screw in line is automatically advanced by the driver.

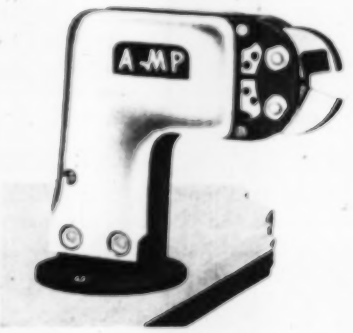
Screwstick is readily adapted to power screw driving, and will cut assembly time in half even when driven with spiral or hand screw drivers. Add to this cost-cutting factor, the savings from unmarred work, unfumbled screws, non-reject production, and you have the ideal fastening device.

Screwsticks are now available in diameters Nos. 0, 1, 2, 3, 4 and 5 in Mild Steel, Brass and Aluminum. The Mild Steel Screwsticks will be hardened for self-tapping when required. Research is being carried on to develop Screwstick in diameters 00 and 000, and in other metals, such as Stainless Steel, Nickel Silver and Monel Metal.

Write to the Thor Independent Automatic Tool Co., Aurora, Ill. for information on the driver and to American Screw Co., Providence, R. I., for information on Screwstick.

NEW BENCH PRESS

A low cost foot-operated bench press with cutting head has been developed by Aircraft-Marine Products, Inc. Tradenamed AMPli-Versal it does a clean cut-



ting job on wire, rod, or sheet metal and is so designed that the cutting head (supplied with the press) can be easily removed and any one of seven other special AMP heads quickly inserted. Other available heads perform such operations as indenting, knock-outs, nibbling, "U"-ing, notching, and installing AMP Solderless Terminals. Blank heads are also available.

The foot-operated AMPli-Versal comes equipped with cutting head. It is boxed complete with foot pedal, adjustable pedal rod, etc., ready to set-up. Requires minimum bench space.

Complete information on AMPli-Versal, Catalog #37450 and additional heads is available upon request to the manufacturer, Aircraft-Marine Products, Inc., 1715 North 4th St., Harrisburg, Pa.

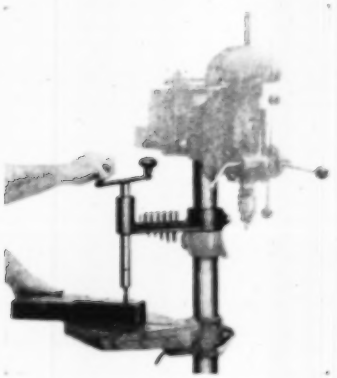
NEW TAPPING MACHINE

Paragon Metal Products, 8619¼ W. 3rd St., Los Angeles 48, has recently announced a new Hand Tapping Machine designed to eliminate tap breakage and to speed up tapping in the tool room and die shop.

This low cost Paragon Precision Hand Tapper is ready to use and can be quickly mounted on the drill press column as a permanent fixture. The drilling machine continues to serve not only as a drill press but also as an "always ready

for use" precision tapping machine.

By utilizing the drill press table and column a Precision Tapping Machine having the following features is obtain-



ed: Adjustable "Tap to table" clearance from 0 inches to 48 inches, a long 3½" spindle guide bearing to assure right angle tapping at all times, full 7½" depth of throat, ready mounting facilities.

The Paragon Precision Tapping Machine comes equipped with seven quick-change tap adapters. Sizes 8-32, 10-24, ¼", 5/16", ⅜", 7/16", ½". For further information write Paragon Metal Products, 416 S. Broadway, Los Angeles 13.

POSITIONETTE SIMPLIFIES ASSEMBLY OPERATIONS

The Positionette, a light, compact, durable, entirely self contained work positioner is factory assembled and ready for use. The table is quickly adaptable to practically all sizes and shapes of objects to be worked on. The handle gives the desired tension in adjusting the table to various working positions.

The Positionette is made of heavy cast aluminum, is 5½" high, weighs 1½ lbs. and its table measures 5¾" by 4". It is manufactured by Solor Foundry, Inc., 1510 University Road, Cleveland 13.

Dry Ice Is Made From Waste Gas

Alert for new ways to satisfy customers, a California company is making a profitable by-product out of waste hitherto removed by a somewhat expensive method. The company processes natural gas with a high percentage of carbon-dioxide, which until recently was taken out and thrown away. However, a new formula enables the company to turn the CO_2 into dry ice—much needed in the community.

Library Research

The United States Testing Co., 1415 Park Avenue, Hoboken, N. J., has announced a new "Library Research" service whereby, for a reasonable fee, business men may take advantage of the company's technical reference library.

This library, built up over a period of almost 70 years, contains thousands of volumes dealing with materials, products and manufacturing processes well indexed for ready reference. In addition, the company subscribes to some 150 trade publications dealing with new developments in the fields of Textiles, Chemistry, Engineering, Bacteriology, Production, Research and maintains an up to date file of Government and trade association specifications.

Technically qualified personnel work closely with trained librarians in the search for and evaluation of practical solutions to problems for immediate application. The company's close contact with dozens of major industries, frequently permits it to advise a manufacturer of a process or material in common use in one industry but totally unknown in another.

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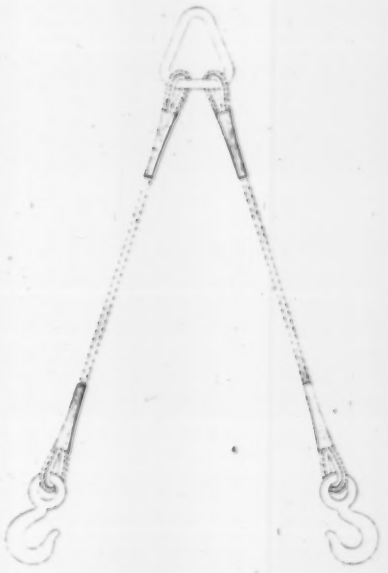

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Second Student Conference Planned

PROF. J. S. DWYER, of Georgia Institute of Technology has announced the dates and topics of the Student Management Conference at Atlanta, April 14-15, 1950. This is a follow-up on the gathering at the University of Alabama, which was acclaimed such a great success last spring. There will be speakers from industry, a banquet, a field trip and other high points.

The hosts are the Georgia Tech chapters of the American Institute of Industrial Engineers, Alpha Pi Mu, and Society for Advancement of Management. Invitations have been sent to a large number of colleges, to send delegations and to have at least one paper presented by each delegation. If you were missed do not be offended; it is a big task to work out the details of a meeting such as this. Instead write to Prof. Dwyer in care of the Industrial Engineering Department at Tech. You will be welcome of course if you merely drop in, but they would appreciate knowing how many are coming.

The general topic of the meeting is what the new graduate can expect when he takes his place in industry as an industrial engineer. Under this the following specific topics have been suggested; subjects for papers to be printed with of course any additional subjects that the members of the delegation might find desirable:

Selling Industrial Engineering to Your Employer.

The Advisability of Graduate Work in Industrial Engineering.

Insurance and the Industrial Engineer.

The Outlook for Jobs in 1950.

Research Work in Industrial Engineering.

The Industrial Engineer in a Consulting Service.

Getting the Right Start in the Industrial Engineering Profession.

Employees Help Modernize Plant

Cooperation between management and employes in planning changes was a major factor in modernizing a leather plant at Fond du Lac, Wis. One major objective during the operation was to keep production going at full speed all the time. Plant engineers consulted a committee of veteran employes, who presented ideas and built models of equipment to switch around in laying out the machines.

Professors Learn About Shop Work

To learn how work is done in the shop in addition to how the books say it should be done, 17 college professors from as many colleges and universities spent their 1949 vacations in the plants of an Eastern manufacturer.

All the professors worked in the shops where electrical machines are designed and built. Each specialized in the work he teaches.

Light Rays Piped In Twisted Tube

A tube of plastic perfected by industrial research will pipe light around corners; even makes it "loop-the-loop." Light entering one end of the tube is reflected by plastic walls so that none of it "leaks." It emerges at the other end of the tube in a concentrated spot.

Buying Machines To Aid Employees

TO LESSEN the physical strain of factory workers, industry is installing more and more labor-saving machinery.

The progress in lightening the traditional back-breaking job of foundrymen was reported recently by the superintendent of a plant at East Springfield, Mass.

Before a work-lightening program was undertaken, the foundry's 75 employes handled a total weight of 1,470 tons every day. A group of five "shake-out" operators removing sand and castings from poured molds, handled top weight of 65 tons each per day.

The superintendent said handling and re-handling materials accounted for 50 per cent of the cost of making small grey-iron castings.

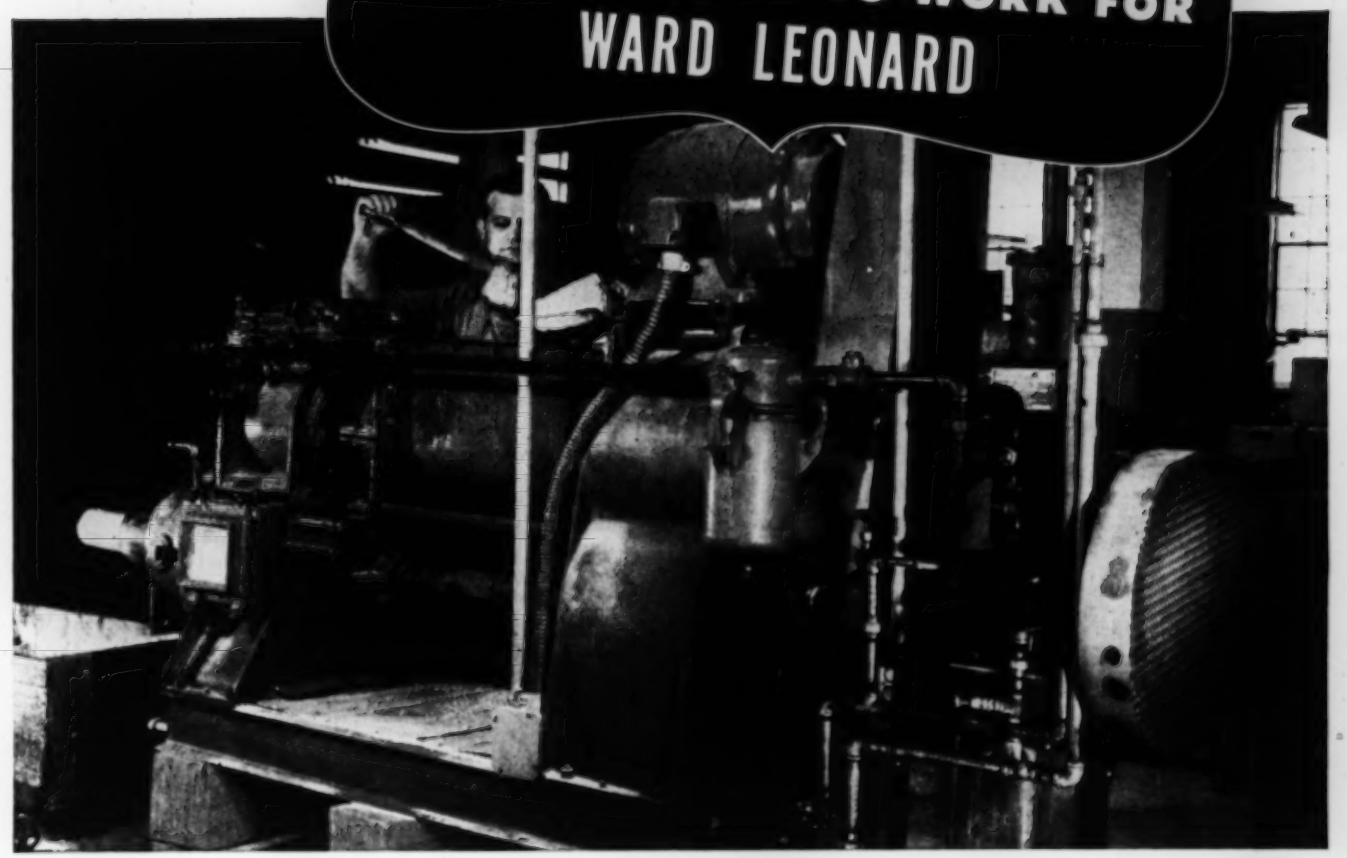
By modernizing the plant, the company ended all the manual lifting hitherto done by molders, who had been handling 22 tons each daily. The change boosted each molder's productivity by more than 50 per cent, and "apparently" solved the problem of getting men to do the work. The company reports it is now easier to hire new employes and keep experienced workers.

The work of the "shake-out" operators who handled 65 tons per day was completely mechanized. Total weight handled by all 75 employes was reduced from 1,470 tons to 294 tons.

More than a dozen hard jobs became mere push-button operations. Gasoline-powered trucks began moving heavy materials. In addition, a new ventilation and dust removal system was installed.

"To compete for work and labor, it is necessary to take every advantage of every available means for reducing expense and effort," the superintendent said. — *Exchange.*

THIS F-R-H Pug Mill HAS TO BE GOOD TO WORK FOR WARD LEONARD



"Production speeded up . . . low cost maintenance . . . improvement over other types," Ward Leonard Electric Company says of its F-R-H Pug Mill. And Ward Leonard should know, for this famous Mount Vernon, N. Y., company has tried other machines and other methods during its 55 years of producing top quality electric control devices.

Ward Leonard's enthusiasm for its F-R-H Pug Mill is nothing new. For F-R-H owners everywhere praise F.R.H's speed and economy. Ward Leonard's F-R-H Pug Mill is being used now for the fast, economical production of compressed ceramic material and for extruding the blanks from which Ward Leonard Vitrohm resistors are made.

Let F-R-H speed *your* production . . . cut your costs . . . and add these savings to your profits. F-R-H Pug Mills are available in a complete range of sizes from small table top laboratory mills to large production line models. Write today for your copy of the F-R-H Bulletin. Let it help you solve your production problems. The Fate-Root-Heath Co., Dept. B-6, Plymouth, Ohio.

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NEWS LETTER

NEWS LETTER RESUMED

WE ARE RESUMING PUBLICATION OF THE NEWS LETTER BECAUSE OF THE DIFFICULTY THAT HAS BEEN EXPERIENCED IN MAINTAINING PUBLICATION OF THE JOURNAL OF INDUSTRIAL ENGINEERING. THE PUBLISHING COMPANY WHICH DID SUCH A SPLENDID JOB OF GETTING OUT THE LAST ISSUE OF THE JOURNAL HAS EXPERIENCED CONSIDERABLE DIFFICULTY IN MAINTAINING AN ADEQUATE EDITORIAL AND PRODUCTION STAFF AND HAS BEEN UNABLE TO CARRY ON THE NECESSARY ADVERTISING SOLICITATION AND PREPARATION WORK. IN SPITE OF THE SPLENDID WORK DONE BY PROFESSOR GROSECLOSE AND THE ASSOCIATE EDITORS, THERE IS STILL SO MUCH THAT MUST BE DONE IN THE PRINTING OFFICE THAT IT IS IMPOSSIBLE TO PUBLISH A MAGAZINE WITHOUT A STRONG PRODUCTION STAFF. FORTUNATELY, IT APPEARS THAT THIS DIFFICULTY IS BEING CORRECTED AND WE HOPE THAT THE JOURNAL WILL BE RESUMED SHORTLY. IN THE MEANTIME, THIS LETTER WILL SERVE TO KEEP OUR MEMBERSHIP IN TOUCH WITH EACH OTHER.

ALL CHAPTER SECRETARIES ARE URGED TO BE DILIGENT IN SENDING REPORTS TO THE NATIONAL HEADQUARTERS, REGULARLY, AND IT IS REQUESTED THAT THESE BE WRITTEN IN SUCH FORM THAT THEY CAN BE INCORPORATED IN THE NEWS LETTER WITH A MINIMUM OF EDITING. INSTEAD OF WRITING A COMPLETE LETTER CONTAINING THE INFORMATION IT IS SUGGESTED THAT A BRIEF TRANSMITTAL LETTER BE USED STATING THAT THERE IS ENCLOSED AN ARTICLE WHICH YOU DESIRE TO HAVE INCORPORATED IN THE NEWS LETTER.

CHAPTER FORMATION

BECAUSE OF THE YOUTH OF OUR ORGANIZATION THERE ARE STILL MANY MEMBERS WHO DO NOT HAVE THE BENEFIT OF BELONGING TO LOCAL CHAPTERS AND MEETING WITH THEIR COLLEAGUES. THIS IS STILL TRUE IN AREAS WHERE THERE ARE ENOUGH MEMBERS TO PERMIT THE FORMATION OF CHAPTERS, OR AT LEAST WHERE THERE ARE ENOUGH POTENTIAL MEMBERS.

THE FORMATION OF A CHAPTER IS A TASK WHICH MUST BE ACCOMPLISHED LOCALLY. THE NATIONAL HEADQUARTERS CAN ASSIST BY PUTTING MEMBERS IN TOUCH WITH EACH OTHER, FURNISHING INFORMATION ABOUT THE STEPS TAKEN BY THE OTHER GROUPS WHICH HAVE MET THE PROBLEM SUCCESSFULLY, SENDING OUT LITERATURE AND IN OTHER INDIRECT WAYS, BUT IN EACH CASE THERE MUST BE A LOCAL GROUP INTERESTED IN GETTING THE WORK STARTED.

THE REWARDS FOR THOSE WHO PARTICIPATE IN FORMING AND OPERATING A CHAPTER ARE SUBSTANTIAL. ALTHOUGH THEY ARE NOT DIRECTLY CASHABLE AT A BANK THEY ARE REALIZED IN GOOD FELLOWSHIP, PROFESSIONAL PROGRESS AND MANY OTHER WAYS.

IT IS SUGGESTED THAT CHAPTERS BE FORMED WHEREVER THERE ARE TEN MEMBERS OR MEMBERS AND QUALIFIED PROSPECTS WHO CAN BE SIGNED UP. EXPERIENCE HAS SHOWN THAT STARTING WITH A SMALL GROUP PROVIDES A DEFINITE NUCLEUS THAT ATTRACTS OTHERS, MORE THAN JUST PROPOSALS TO GET TOGETHER AS A CHAPTER AT SOME LATER DATE. WHERE THE CHAPTER CANNOT BE STARTED AT ONCE, IT IS SUGGESTED THAT THOSE WHO ARE INTERESTED IN WORKING ON THE PROJECT CONSTITUTE THEMSELVES AS THE _____ CHAPTER ORGANIZING COMMITTEE. WE WILL IMMEDIATELY SEND YOU A COPY OF THE CHAPTER ORGANIZATION MANUAL, ON REQUEST.

PROFESSIONAL REGISTRATION

WHEN THE AMERICAN INSTITUTE WAS FOUNDED IT WAS DECIDED NOT TO MAKE PROFESSIONAL REGISTRATION WITH A STATE BOARD OF ENGINEERING REGISTRATION MANDATORY FOR MEMBERSHIP, BUT TO ENCOURAGE ALL IE'S TO SEEK REGISTRATION. THIS WAS DONE BECAUSE IT WAS RECOGNIZED THAT THE LARGE MAJORITY OF MEN IN OUR BRANCH OF THE ENGINEERING PROFESSION ARE EMPLOYED IN FACTORIES AND OTHER ORGANIZATIONS WHERE THERE IS LESS REASON TO BE AWARE OF THE TREND TOWARD REGISTRATION OF ENGINEERS THAN IN PUBLIC WORKS, ENGINEERING OFFICES AND SIMILAR ESTABLISHMENTS.

INSTEAD, THE POLICY WAS ADOPTED OF ACCEPTING REGISTRATION AS PRIMA FACIE EVIDENCE OF ELIGIBILITY TO BELONG TO OUR ORGANIZATION. IT IS FEARED, BY SOME OF THE OLDER MEMBERS, HOWEVER, THAT THERE IS INSUFFICIENT INTEREST IN REGISTRATION ON THE PART OF THE IE'S. WITHIN THE CONFINES OF OUR OWN MEETINGS AND IN A PRIVATE PUBLICATION SUCH AS THIS, IT CAN BE SAID THAT HARDLY ANY OTHER BRANCH HAS SO MUCH TO GAIN BY ACTIVELY PUSHING THE REGISTRATION PROGRAM. THERE ARE STILL MANY QUARTERS IN WHICH IT IS CONTENDED THAT IE IS NOT PROPERLY AN ENGINEERING BRANCH AT ALL, AND IN FACT THERE ARE SOME STATES WHEREIN IT IS DIFFICULT IF NOT IMPOSSIBLE TO OBTAIN REGISTRATION AS AN IE.

NOTHING WILL CONTRIBUTE SO HANDSOMELY TO A PUBLIC RECOGNITION OF THE IMPORTANCE OF IE AS FOR A LARGE MAJORITY OF ITS MEMBERS TO ATTAIN REGISTRATION. THERE ARE POWERFUL FORCES AT WORK TRYING TO LIMIT REGISTRATION TO MEN WHO ACTUALLY DESIGN BRIDGES AND OTHER STRUCTURES "DIRECTLY AFFECTING HUMAN LIFE AND SAFETY." AT LEAST PART OF THIS OPPOSITION TO REGISTRATION OF ALL ENGINEERS WHO ARE ENGAGED IN TRUE PROFESSIONAL WORK STEMS FROM THE FEAR OF CERTAIN EMPLOYERS THAT WHEN ENGINEERS UNDERSTAND THEIR OWN POSITION AS MEMBERS OF AN HONORED AND ANCIENT PROFESSION, IT WILL NO LONGER BE POSSIBLE TO HIRE THEM FOR PICAYUNE SALARIES AS IS STILL TOO OFTEN THE CASE. EVERY CHAPTER, BOTH SENIOR AND STUDENT, SHOULD TAKE AN ACTIVE INTEREST IN THIS PROBLEM AND MAKE AN EFFORT TO INCREASE THE NUMBER OF REGISTERED IE'S. THE LOGICAL THING IS FOR ALL GRADUATING SENIORS TO TAKE THE EXAMS AS SOON AS THEY ARE ELIGIBLE TO DO SO. MEN WHO HAVE GOTTEN OUT INTO EMPLOYMENT WITHOUT STARTING ON THEIR REGISTRATION SHOULD ALSO BE ENCOURAGED IN THIS DIRECTION AND EVERY CHAPTER SHOULD MAKE AN EFFORT TO OPERATE REFRESHER COURSES TO AID THOSE WHO ARE TO TAKE THE EXAMS.

MANY HESITATE TO TAKE THE EXAMS FOR FEAR OF DISPLAYING THEIR IGNORANCE. A PROPER ENVIRONMENT CAN BE ESTABLISHED IN CHAPTERS IN WHICH IT WILL BE CLEARLY UNDERSTOOD THAT THE EXAMS NECESSARILY CONTAIN BASIC MATHEMATICS AND OTHER MATERIAL WHICH MEN OUT IN PRACTICE DO NOT USE DAILY AND THEREFORE BECOME RUSTY IN HANDLING. THUS IT CAN BE ESTABLISHED THAT IT IS NO DISGRACE TO FAIL ON THE FIRST ATTEMPT, BUT A MUTUAL EFFORT TO BRUSH UP CAN BE ENCOURAGED. ON THE OTHER HAND, IN CERTAIN QUARTERS EXAMS HAVE CONTAINED UNREASONABLE QUESTIONS, BUT A CHAPTER OPERATING AS A CHAPTER IN COOPERATION WITH THE NATIONAL ORGANIZATION CAN TAKE STEPS TO PERSUADE THE AUTHORITIES TO CORRECT SUCH SITUATIONS. VERY OFTEN THEY ARE CAUSED ONLY BY A LACK OF UNDERSTANDING OF WHAT THE IE'S WORK REALLY IS.

INDUSTRIAL ENGINEERING ORGANIZATIONS

IT HAS COME TO THE ATTENTION OF THE OFFICERS OF THE AIIE THAT SOME PEOPLE ARE CONFUSING OUR ORGANIZATION WITH OTHERS WHICH DESCRIBE THEMSELVES AS SOCIETIES OF INDUSTRIAL ENGINEERS UNDER VARIOUS NAMES. SO FAR AS WE KNOW OURS IS THE ONLY ONE THAT IS MADE UP EXCLUSIVELY OF MEN WHO HAVE HAD PROFESSIONAL TRAINING IN OUR BRANCH OF THE PROFESSION.

ONE POINT WHICH HAS BEEN REFLECTED IN LETTERS RECEIVED IN THE NATIONAL HEADQUARTERS IS THAT SOME OF THE SOCIETIES HAVE ENDORSED COMMERCIAL PRODUCTS. SO FAR THE AIIE HAS DEFINITELY NOT ISSUED ANY ENDORSEMENTS, AWARDED ANY PRIZES OR OTHERWISE INDICATED PREFERENCE FOR ANY MANUFACTURED ARTICLE OR COMMODITY. TO DO SO WOULD REQUIRE A MAJOR CHANGE OF POLICY AND WOULD HAVE TO BE REFERRED TO THE MEMBERSHIP FOR ADOPTION. THEREFORE, IF ANYONE EVER QUESTIONS YOU ABOUT OUR GROUP HAVING RECOMMENDED CERTAIN ITEMS YOU MAY STATE EMPHATICALLY THAT IT WAS NOT YOUR ASSOCIATION.

IT WOULD BE VERY HELPFUL IF ANY AND ALL MEMBERS HAVING INFORMATION ABOUT THE OPERATIONS OF OTHER ORGANIZATIONS PURPORTING TO BE INDUSTRIAL ENGINEERS WOULD SEND A REPORT TO THE PRESIDENT. IF THERE ARE ANY OTHER GROUPS WITH EQUALLY HIGH STANDARDS, WE WOULD LIKE TO COOPERATE WITH THEM. IF THERE ARE GROUPS WITHOUT STANDARDS WE WOULD LIKE TO KNOW ABOUT THEM TO MAKE THE PROPER DISTINCTION BETWEEN THEM AND OURSELVES.

NATIONAL CONVENTION

AT THE LAST MEETING OF THE EXECUTIVE COMMITTEE, A MOTION WAS PASSED TO ACCEPT THE INVITATION OF THE CLEVELAND CHAPTER TO HOLD THE 1951 NATIONAL CONVENTION IN THAT CITY. ARRANGEMENTS HAVE BEEN MADE WITH THE STATLER HOTEL FOR A MEETING ON SATURDAY, JUNE 16TH AND IT IS URGED THAT ALL MEMBERS NOW RESERVE THAT DATE AND BEGIN TO LOOK FOR COMPANY TRIPS OR OTHER EXCUSES TO MAKE OFFICIAL TRAVEL TO CLEVELAND AT THAT TIME.

THE NATIONAL CONVENTION HELD IN COLUMBUS AT THE DESHLER-WALLICK HOTEL ON SATURDAY, JUNE 17TH WAS A GREAT SUCCESS. APPROXIMATELY 100 MEMBERS AND GUESTS ATTENDED. A FINE ADDRESS WAS MADE BY MR. R. CONRAD COOPER, VICE PRESIDENT, INDUSTRIAL ENGINEERING, OF THE UNITED STATES STEEL CORPORATION. COPIES OF HIS TALK, "THE INDUSTRIAL ENGINEER'S PLACE ON THE MANAGEMENT TEAM" ARE AVAILABLE TO THOSE WHO ARE INTERESTED.

THREE FELLOWS OF THE AMERICAN INSTITUTE OF INDUSTRIAL ENGINEERS WERE ELECTED. DEAN CHARLES E. MACQUIGG OF THE COLLEGE OF ENGINEERING AT OHIO STATE UNIVERSITY PRESENTED THE CERTIFICATE OF FELLOW POSTHUMOUSLY TO JOHN YOUNGER AND THE AWARD WAS ACCEPTED BY MRS. YOUNGER. CERTIFICATES WERE ALSO PRESENTED TO DR. LILLIAN GILBRETH AND TO MR. COOPER.

THE MEETING WAS PRESIDED OVER BY MR. JOHN COLEMAN, VICE PRESIDENT OF THE NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS. MR. DWIGHT GARDNER, RETIRING PRESIDENT, INSTALLED MR. ROBERT E. ALLEN AS HIS SUCCESSOR.

DIRECTORY MAILED

DURING THE PAST FEW WEEKS COPIES OF A MEMBERSHIP DIRECTORY (AS OF JUNE 1950) WERE MAILED TO ALL OF THE MEMBERS FOR WHOM WE HAD CORRECT ADDRESSES. IF YOU DID NOT RECEIVE A COPY OF THE DIRECTORY THERE ARE STILL A NUMBER AVAILABLE AND ONE WILL BE MAILED TO YOU UPON REQUEST. THERE ARE A NUMBER OF ERRORS IN THE DIRECTORY BECAUSE IT TOOK MANY WEEKS TO PREPARE AND CHANGES OCCURED DURING THE TIME OF ITS PREPARATION AND, IN SOME INSTANCES, THE INFORMATION AVAILABLE IN OUR FILES AT THE TIME OF BEGINNING THE PROJECT WAS NOT CORRECT.

IT IS HOPED THAT THE FIRST ISSUE WILL STIMULATE MEMBERS TO KEEP THE HEADQUARTERS OFFICE FURNISHED WITH INFORMATION SO THAT AT A LATER DATE A NEW DIRECTORY MAY BE PUBLISHED THAT WILL BE MORE COMPLETE. THE FIRST ISSUE COMPRISED MORE THAN SEVENTY PAGES AND ENDEAVORS TO GIVE BRIEF BIOGRAPHICAL INFORMATION ABOUT EACH MEMBER INSTEAD OF MERELY PRESENTING NAME AND ADDRESS.

OFFICE SECRETARY

ONE OF THE GREAT DIFFICULTIES OF ADMINISTRATIVE OPERATION EXPERIENCED BY THE INSTITUTE IN THE PAST WAS THE NECESSITY OF USING PART-TIME STUDENT HELP. IN THE BEGINNING WHEN THE VOLUME OF WORK WAS SMALL, THIS WAS AN ADVANTAGE BECAUSE THE TIME PURCHASED COULD BE ADJUSTED EXACTLY TO THE AMOUNT OF WORK TO BE DONE. HOWEVER, AS THE ORGANIZATION GREW IT BECAME IMPOSSIBLE TO HANDLE THE MANY PROBLEMS IN THIS MANNER. WE ARE THEREFORE PROUD TO REPORT THAT WE NOW HAVE MISS CHARLOTTE PATTERSON AS THE OFFICE SECRETARY AND THAT SHE IS DEVOTING HER FULL TIME TO ENGINEERING SOCIETY WORK, EITHER WITH THE AIIE OR WITH THE OHIO ENGINEERS' PLACEMENT SERVICE, INC. MISS PATTERSON IS AN EXPERIENCED SECRETARY WHO IS IN THE PROCESS OF WORKING OUT OF THE DIFFICULTIES CREATED DURING THE PERIOD WHEN WE DID NOT HAVE ADEQUATE SECRETARIAL HELP.

BECAUSE OF THE CHANGE NOW MADE, THOSE MEMBERS WHO HAVE HAD TO WAIT LONG PERIODS FOR REPLIES TO LETTERS OR WHO HAVE RECEIVED BILLS FOR DUES ISSUED IN ERROR, OR HAVE OTHERWISE EXPERIENCED DIFFICULTY, MAY REST ASSURED THAT ADMINISTRATION WILL FLOW MUCH MORE SMOOTHLY IN THE FUTURE.

SECOND ANNIVERSARY

OUR SOCIETY HAD ITS SECOND ANNIVERSARY ON JANUARY 12, 1951, HAVING BEEN IN EXISTENCE FOR THREE YEARS. IN THIS TIME THE IDEA OF A PROFESSIONAL TECHNICAL INSTITUTE OF INDUSTRIAL ENGINEERS HAS "CAUGHT ON" TO AN AMAZING DEGREE. WE NOW HAVE 8 CITY CHAPTERS AND 14 STUDENT CHAPTERS AND GROWTH IS BEING MADE EACH MONTH. THE MEMBERSHIP TOTALS MORE THAN 2500 MEN.

OF COURSE THERE ARE SOME WHO HAVE BEEN DISAPPOINTED BECAUSE GROWTH HAS NOT BEEN FASTER AND BECAUSE THE ORGANIZATION HAS NOT OFFERED MORE SERVICES TO MEMBERS. BUT WHEN WE LOOK AT THE PROBLEM OBJECTIVELY AND CONSIDER THAT THREE YEARS AGO THERE WAS NOTHING, IT CAN BE SEEN THAT THERE IS AMPLE ROOM FOR PRIDE INSTEAD OF APOLOGIES.

CONTRAST OUR SITUATION WITH SOME OF THE OTHER ENGINEERING SOCIETIES WHICH HAVE BEEN OPERATING FOR SCORES OF YEARS. CONSIDER THE FACT THAT THE GREATER PART OF THE MEN IN THE FIELD OF INDUSTRIAL ENGINEERING ARE COMPANY EMPLOYEES. THEY DO NOT HAVE THE PROFESSIONAL IDENTIFICATION IN THEIR WORK THAT MEN IN SOME OTHER BRANCHES HAVE. THERE IS A GREAT TENDENCY TO LOSE SIGHT, WHEN ONE HOLDS A POSITION AS A SALESMAN OR A PRODUCTION MANAGER, OF THE FACT THAT HE IS ALSO A MEMBER OF A PROFESSIONAL GROUP.

NEW NATIONAL HEADQUARTERS

BECAUSE OF THE GROWTH IN MEMBERSHIP AND NUMBER OF CHAPTERS, THE ADMINISTRATIVE PROBLEMS OF THE NATIONAL HEADQUARTERS REQUIRED MORE OFFICE SPACE. TEMPORARILY A SMALL ROOM WAS RENTED AT 145 NORTH HIGH STREET. NOW ARRANGEMENTS HAVE BEEN WORKED OUR FOR ADEQUATE SPACE AT 40 WEST GAY STREET, AS A SUB-TENANT OF THE OHIO SOCIETY OF PROFESSIONAL ENGINEERS. THIS WILL BE ADVANTAGEOUS BECAUSE MISS PATTERSON, OUR OFFICE SECRETARY, ALSO WORKS PART TIME FOR THE OHIO ENGINEERS PLACEMENT SERVICE, AND THUS WILL ALWAYS BE AVAILABLE DURING BUSINESS HOURS.

WITH OUR OWN HOME IN A GOOD DOWN TOWN OFFICE BUILDING, WE HAVE CONCLUDED ANOTHER STEP IN THE GROWING UP OF AIIE, AND WE WILL BE ABLE TO RENDER MORE AND BETTER SERVICE TO MEMBERS.

NO ENDORSEMENTS

AS MENTIONED ELSEWHERE, AIIE HAS NOT ENDORSED ANY COMMERCIAL PRODUCTS. ALL MEMBERS ARE REQUESTED TO AID IN MAKING IT CLEAR TO THE PUBLIC THAT WE ARE NOT A PARTY TO ANY SCHEMES FOR LENDING PROFESSIONAL STANDING TO BEER, AUTOMOBILES, WASHING MACHINES OR OTHER PRODUCTS.

THERE IS AN ORGANIZATION IN CHICAGO CALLED THE AMERICAN SOCIETY OF INDUSTRIAL ENGINEERS WHICH HAS EMBARKED UPON THE PROJECT OF GRANTING ENDORSEMENTS. THIS PRESENTS A GREAT PROBLEM TO OUR SOCIETY BECAUSE OF THE CONFUSION IN THE PUBLIC MIND. THE COMPANIES WHO RECEIVE ENDORSEMENTS OF THEIR PRODUCTS HAVE LARGE ADVERTISING BUDGETS AND WE CANNOT HOPE TO COMPETE IN THE MATTER OF MAKING PUBLIC THE FACT THAT WE ARE NOT INVOLVED.

AS OUR MEMBERS WELL KNOW, THE AIIE IS A TECHNICAL PROFESSIONAL SOCIETY WITH HIGH STANDARDS FOR MEMBERSHIP. IT DOES NOT SEEM THAT IT IS ETHICAL FOR ANY PROFESSIONAL ORGANIZATION TO MAKE SUCH ENDORSEMENTS. THE SITUATION IS NOT YET COMPARABLE TO THE ENDORSEMENTS BY THE AMERICAN MEDICAL ASSOCIATION.

CLEVELAND WORK FACTOR CONFERENCE GREAT SUCCESS

A REPORT JUST RECEIVED REVEALS THAT MORE THAN THREE HUNDRED PERSONS ATTENDED THE 1951 INDUSTRIAL ENGINEERING CONFERENCE AT THE STATLER HOTEL IN CLEVELAND ON FRIDAY FEBRUARY 9TH. THE MEETING WAS VERY WELL PUBLICIZED, THE COMMITTEE GOT OUT MORE THAN 14,000 DIRECT MAIL PIECES OF ANNOUNCEMENT. THIS IS AN EXCELLANT PRELIMINARY TO THE 1951 NATIONAL CONVENTION WHICH WILL BE HELD IN CLEVELAND.

ATTENDING ENGINEERS HEARD TALKS BY MESSRS. QUICK AND GODWIN OF THE STAFF OF THE WORK-FACTOR COMPANY IN WHICH THE GENERAL OUTLINES OF THE SYSTEM WAS GIVEN AND THEN DIVIDED INTO GROUPS FOR DISCUSSION OF SPECIFIC PHASES OF THE APPLICATION OF THE WORK-FACTOR SYSTEM. THE LEADERS OF THESE SECTION MEETINGS AND THEIR SUBJECTS WERE: STEWART WEBSTER, CHIEF TIME STUDY ENGR. G. E. ERIE WORKS, REFRIGERATOR ASSEMBLY; FRANK BADGER, BELL & HOWELL CO., STANDARD DATA; ROBERT BLAIR, BELL & HOWELL, MACHINE SHOP PROBLEMS; PAT BRADY, SYLVANIA ELEC. BUFFALO, IND. ENG. ELECTRIC ASSEMBLY; HARRY MCNAMARA, CHIEF IND. ENGR. RCA-VICTOR CAMDEN, PROJECTION WELDING; WM. RILEY, PERSONNEL DIRECTOR ANNACONDA WIRE & CABLE CO, ASSEMBLY OF HEAVY MATERIAL; G. A. WELLING, CHIEF IND. ENGR. OSBORNE MFG. CO., CLEVELAND, PLANT MAINTENANCE; OTTO WOERNER VICE PRES. H. H. BROWN SHOE CO. WORCESTER MASS. SHOE MFG.; JAS DUCAN, PARTNER IN WORK FACTOR CO., CLERICAL OPERATIONS AND JOHN TAGGART ALSO OF WORK FACTOR CO. ON COTTON WINDING

AT LUNCHEON BRIGADIER GENERAL H. F. SAFFORD, NOW PRESIDENT OF THE OHIO RUBBER COMPANY WAS SCHEDULED TO TALK ABOUT IND. ENGR. AS APPLIED TO THE ARMAMENT PROGRAM. INSTEAD HE CHOSE TO GIVE HIS VIEWS OF THE RELATIONS BETWEEN TOP BRASS AND INDUSTRY. THIS WAS VERY WELL RECEIVED BY THE GROUP AND FAVORABLY REPORTED IN THE CLEVELAND PLAIN DEALER. THE CLEVELAND CHAPTER IS TO BE CONGRATULATED ON ITS INITIATIVE AND COURAGE IN PLANNING THIS VENTURE AND FOR THE SUCCESS WITH WHICH IT WAS EXECUTED.

DAYTON CHAPTER HAS "M T M" MEETING

ON MONDAY FEBRUARY 5TH, THE DAYTON CHAPTER MET JOINTLY WITH THE INDUSTRIAL METHODS SOCIETY OF THAT CITY FOR A PROGRAM BY SERGE A. BIRN, "HOW M T M CAN HELP WAR PRODUCTION". THE ATTENDANCE WAS VERY GOOD AND THE MEMBERS OF BOTH ORGANIZATIONS REPORTED THAT THEY HAD GAINED MUCH FROM THE MEETING. ON DECEMBER 5TH THE DAYTON GROUP HELD THEIR ANNUAL BANQUET AND HAD THEIR WIVES AS GUESTS. PROF. JOHN GEDEON, PSYCHOLOGIST, TALKED ON MENTAL PROCESSES, IN A WAY THAT WAS AT THE SAME TIME INSTRUCTIVE AND VERY ENTERTAINING. MEMBERS OF THE CHAPTER, HARRY PLACKE AND HIS "FUNSTERS" ADDED TO THE ENJOYMENT OF THE EVENING.

COLUMBUS CHAPTER FALL OPENER

THE FALL OPENER OF THE COLUMBUS CHAPTER WAS HELD AT THE PLANT OF THE ORAN COMPANY WHERE THE MEMBERS WERE GUESTS OF MR HENRY W. KELLY FOR A FINE BUFFET SUPPER. FOLLOWING THE SUPPER THEY WERE CONDUCTED ON A TOUR OF THE PLANT BY MR. KELLY AND PROF. W. G. STANTON, WHO HAS LEFT THE OHIO STATE UNIVERSITY AND ACCEPTED A POSITION AS MR. KELLY'S ASSISTANT. THE REMAINDER OF THE EVENING WAS DEVOTED TO A DISCUSSION OF PRODUCTION CONTROL AND OTHER IE PROBLEMS IN A SMALL PLANT.

OTHER CHAPTER NEWS

IT IS HOPED THAT WITH THE RESUMPTION OF THE NEWS LETTER THAT EACH OF THE CHAPTERS WILL BE MORE CAREFUL ABOUT SENDING IN REPORTS OF ITS ACTIVITIES. IT WILL BE IMPOSSIBLE IN THIS ISSUE TO REPORT ALL OF THE FINE MEETINGS THAT HAVE COME TO THE ATTENTION OF THE NATIONAL HEADQUARTERS, BUT WE ARE ALSO CERTAIN THAT THERE HAS BEEN A GREAT DEAL OF ACTIVITY WHICH HAS NOT BEEN REPORTED. OKLAHOMA A & M STUDENT CHAPTER - THIS GROUP PUBLISHES A FINE BULLETIN CALLED THE IE NEWS AND IT IS HOPED THAT THEY WILL ADD TO THEIR MAILING LIST AT LEAST ONE OFFICER OF EACH OF THE OTHER STUDENT AND SENIOR CHAPTERS. IT IS ALSO HOPED THAT OTHER CHAPTERS HAVING NEWS LETTERS WILL DO LIKEWISE. THIS WILL SUPPLEMENT THE NATIONAL NEWS LETTER AND REDUCE THE AMOUNT OF MEETING MATERIAL THAT IT IS NECESSARY TO PUBLISH THEREIN. THE OKLAHOMA GROUP HAS HAD A GOOD SERIES OF MEETINGS, THAT OF JANUARY 12, 1951 BEING DEVOTED TO THE ELECTION OF NEW OFFICERS. CINCINATTI SENIOR CHAPTER - DANA E. CARWRIGHT, SECRETARY, REPORTS THAT A FINE MEETING WAS HELD ON JANUARY 31ST WHEN THE GROUP MADE A TOUR OF THE PLANT OF THE PHILIP CAREY MFG. AND OBSERVED THE MAKING OF BUILDING MATERIALS. THE FEBRUARY MEETING WAS HELD ON THE 15TH AT THE HOTEL ALMS AND WAS DEVOTED PRIMARILY TO THE TRANSACTION OF NECESSARY CHAPTER BUSINESS SUCH AS THE RATIFICATION OF THE CONSTITUTION AND ARRANGEMENTS FOR AFFILIATION WITH THE CINCINNATI ENGINEERING COUNCIL. TEXA TECH STUDENT CHAPTER - THIS GROUP ALSO PUBLISHES A PAPER CALLED "TIME AND MOTIONS" AND ALTHOUGH NO RECENT COPIES HAVE BEEN RECEIVED WE UNDERSTAND FROM OTHER SORCES THAT THE ORGANIZATION IS CONTINUING TO FLOURISH.

EXECUTIVE COMMITTEE MEETINGS

ON FRIDAY FEBRUARY 16TH THE EXECUTIVE COMMITTEE OF THE NATIONAL ORGANIZATION, WHICH ALSO COMPRISED A QUOROUM OF THE BOARD OF TRUSTEES, MET IN COLUMBUS AT THE HOME OF VICE PRESIDENT JOE MYERS. THOSE PRESENT WERE, PAST PRES. DWIGHT GARDNER, PRES. ROBERT ALLEN, V. PRES. JOE MYERS, TREASURER STEPHEN VEIRS, EXECUTIVE SECRETARY WYLLYS STANTON AND ASSISTANT EXEC. SECY JOE SOUTHERN. THE MOST IMPORTANT PART OF THE MEETING WAS THE ESTABLISHMENT OF A NEW BUDGET. DURING THE EARLY YEARS OF OUR ORGANIZATION IT WAS NECESSARY TO OPERATE ON A VERY MODEST BASIS UNTIL THE REQUIRED NUMBER OF IE'S COULD BE BROUGHT TOGETHER, BUT NOW IT IS EVIDENT THAT THE TIME HAS COME TO STEP UP THE RATE OF ALL ACTIVITIES, AND THAT THE FUNDS NEEDED TO DO SO WILL HAVE TO BE RAISED. THE BUDGET AGREED UPON IS AS FOLLOWS: RENT $420, TELEPHONE $180, SECRETARIAL HELP $2700, MISCELLANEOUS SUPPLIES $600, POSTAGE $500, PRINTING $200, MISCELLANEOUS CONTINGENCIES $200, MAKING A TOTAL FOR HEADQUARTERS OPERATIONS $4800. OTHER ITEMS ARE; NEWS LETTER $1000, JOURNAL $2400, CONVENTION RESERVE $200, AND MEETING EXPENSES $600, MAKING A GRAND TOTAL OF $9000. ALL FIGURES ARE ON AN ANNUAL BASIS.

A COMPLETE REPORT OF RECEIPTS AND EXPENDITURES WILL BE MADE IN A SUBSEQUENT ISSUE OF THE LETTER AFTER THEY HAVE BEEN AUDITED BY A CPA AND INCLUDING MARCH, FOR IT WAS THROUGH LAST MARCH THAT AN OUTSIDE AUDIT WAS MADE. WITH THE PRESENT DAY HIGH COSTS OF LIVING IT IS IMPOSSIBLE TO COUNT ON OPERATING AN ADEQUATE HEADQUARTERS FOR ANYTHING LESS THAN THE AMOUNT PLANNED. PART OF THE POOR COMMUNICATIONS BETWEEN HEADQUARTERS AND THE MEMBERS IN RECENT MONTHS HAVE BEEN DUE TO THE FACT THAT WE HAVE TRIED TO OPERATE ON TOO SMALL A BUDGET. NOTE THAT NOTHING IS INCLUDED FOR PAYMENT FOR THE TIME OF ANY OFFICER, SUCH PROGRESS AS HAS BEEN MADE THUS FAR HAS BEEN DUE TO THE DONATION OF A GREAT DEAL OF EXECUTIVE SERVICE AND THIS WILL PROBABLY CONTINUE TO BE TRUE.

THE OTHER ITEMS PROVIDE FOR ISSUING THE NEWS LETTER APPROXIMATELY TEN TIMES DURING EACH YEAR, (THIS ONE COSTS IN EXCESS OF $100 FOR PUBLICATION, PAPER AND POSTAGE) AND PUBLICATION OF THE JOURNAL FOUR TIMES PER YEAR. THE NEXT ISSUE WILL BE OUT IN MAY AND EDITORIAL MATERIAL SHOULD BE SENT IN AT ONCE. THE REMAINING ITEMS ESTABLISH A CONVENTION RESERVE FUND WHICH WILL BE BUILT UP TO HELP WITH CONVENTION EXPENSES, OR WILL BE AUGMENTED IN THOSE YEARS WHEN A SUCCESSFUL CONVENTION PRODUCES A SURPLUS. THE MEETING EXPENSE BUDGET IS PLANNED TO PUT AN END TO THE PRACTISE OF HAVING OFFICERS AND DIRECTORS GIVE NOT ONLY THEIR TIME, BUT FOOT THEIR OWN EXPENSES FOR ATTENDANCE AT MEETINGS. IT WILL ALSO MAKE IT POSSIBLE FOR SOME MEN TO ATTEND FROM MORE DISTANT POINTS, THERE-BY BROADENING THE AREA OF REPRESENTATION.

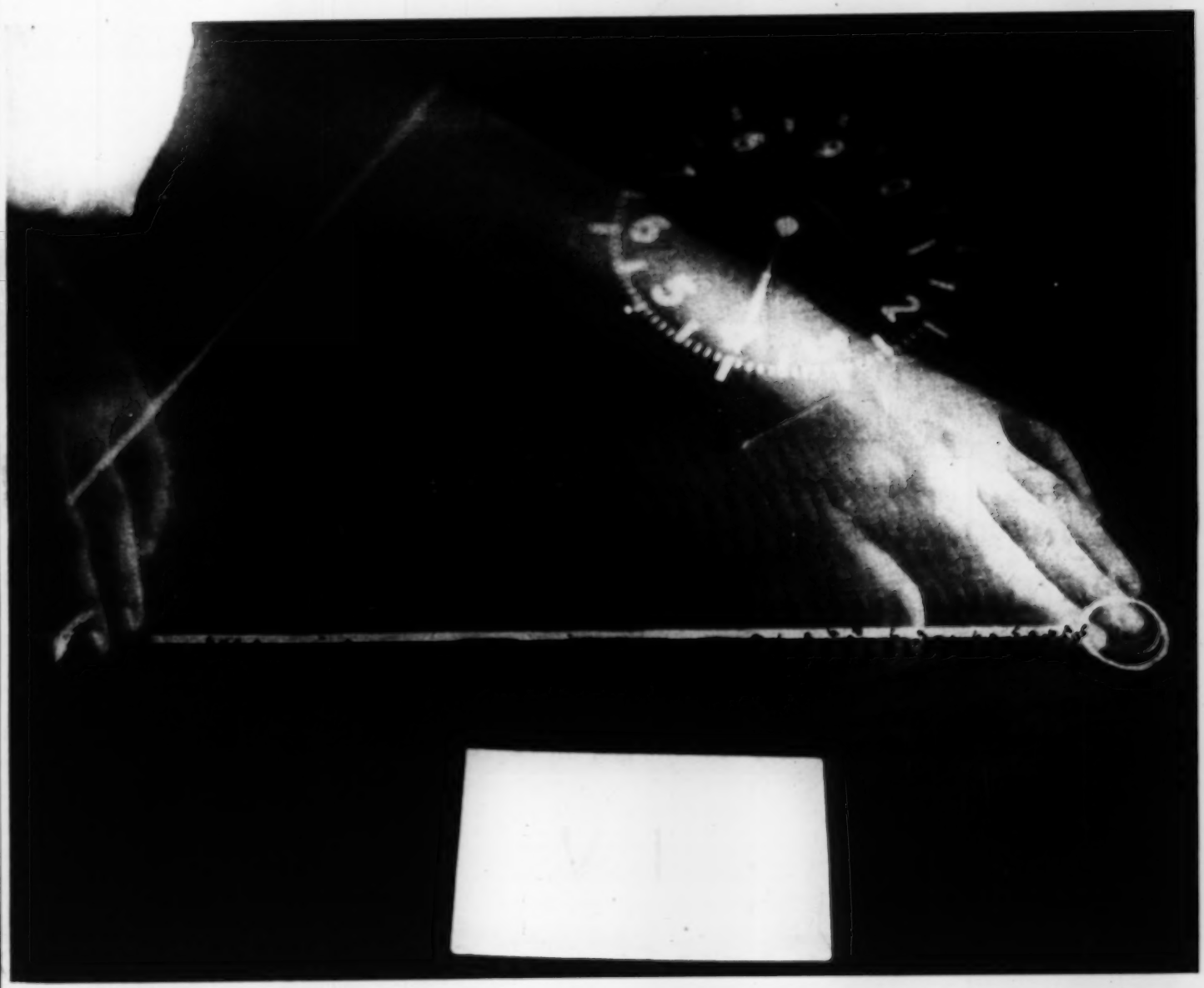
IN ORDER TO MEET THE INCREASED BUDGET IT WAS VOTED THAT THE DUES BE INCREASED IN EACH CATEGORY OF MEMBERSHIP TO THE FOLLOWING RATES; STUDENT $2; JUNIOR $5: AND SENIOR $10. EVEN AT THE NEW RATES THE AIIE WILL STILL HAVE ONE OF THE LEAST COSTLY RATE SCHEDULES OF ANY NATIONAL ENGINEERING ORGANIZATION. THE NEW RATES ARE EFFECTIVE ON ALL PAYMENTS DUE ON OR AFTER APRIL 1ST, 1951.

NEW COMMITTEES ESTABLISHED

ANOTHER FEATURE OF THE EXECUTIVE COMMITTEE MEETING WAS THE DECISION TO CREATE A NUMBER OF COMMITTEES FOR SERVICE IN INDUSTRIAL ENGINEERING. THIS IS IN DISTINCTION FROM THE PREVIOUSLY ESTABLISHED COMMITTEES TO SERVICE THE ORGANIZATION. THE OBJECTIVE OF THE NEW COMMITTEES WILL BE TO FORM UNBIASED OPINIONS OF THINGS BEING DONE IN VARIOUS FIELDS OF IE AND TO INFORM OUR MEMBERS, INCLUDING REFERENCES WHEN SUITABLE TO THE WORK OF OTHER SOCIETIES WHO PENETRATE MUCH MORE DEEPLY INTO CERTAIN SPECIALTY AREAS THAN IS POSSIBLE FOR A GENERAL IE GROUP SUCH AS OURS. THE COMMITTEES CONSIDERED SO FAR ARE; ON SYNTHETIC TIMES SYSTEMS; ON INDUSTRIAL SAFETY AND ACCIDENT PREVENTION; ON QUALITY CONTROL; ON PRODUCTION CONTROL SYSTEMS: ON MATERIALS HANDLING SYSTEMS AND COSTS THEREOF; ON APPLICATIONS OF IE TO NEW AND UNUSUAL FIELDS. IT IS RECOGNIZED THAT IN EACH OF THESE AREAS, AND OTHERS THAT MAY COME UP FOR ATTENTION LATER, THERE ARE GROUPS OF PROPONENTS SUCH THAT IT WILL BE A PROBLEM TO OBTAIN A FAIR AND UNBIASED EVALUATION, BUT IT IS BELIEVED THAT IT MAY BE POSSIBLE TO HAVE INTERCHANGES BETWEEN THE PROPONENTS, IN DISCUSSIONS WITH IMPARTIAL PERSONS, PERHAPS UNIVERSITY MEN ACTING AS MODERATORS.

Jun 13 '51 0

the Journal of INDUSTRIAL ENGINEERING



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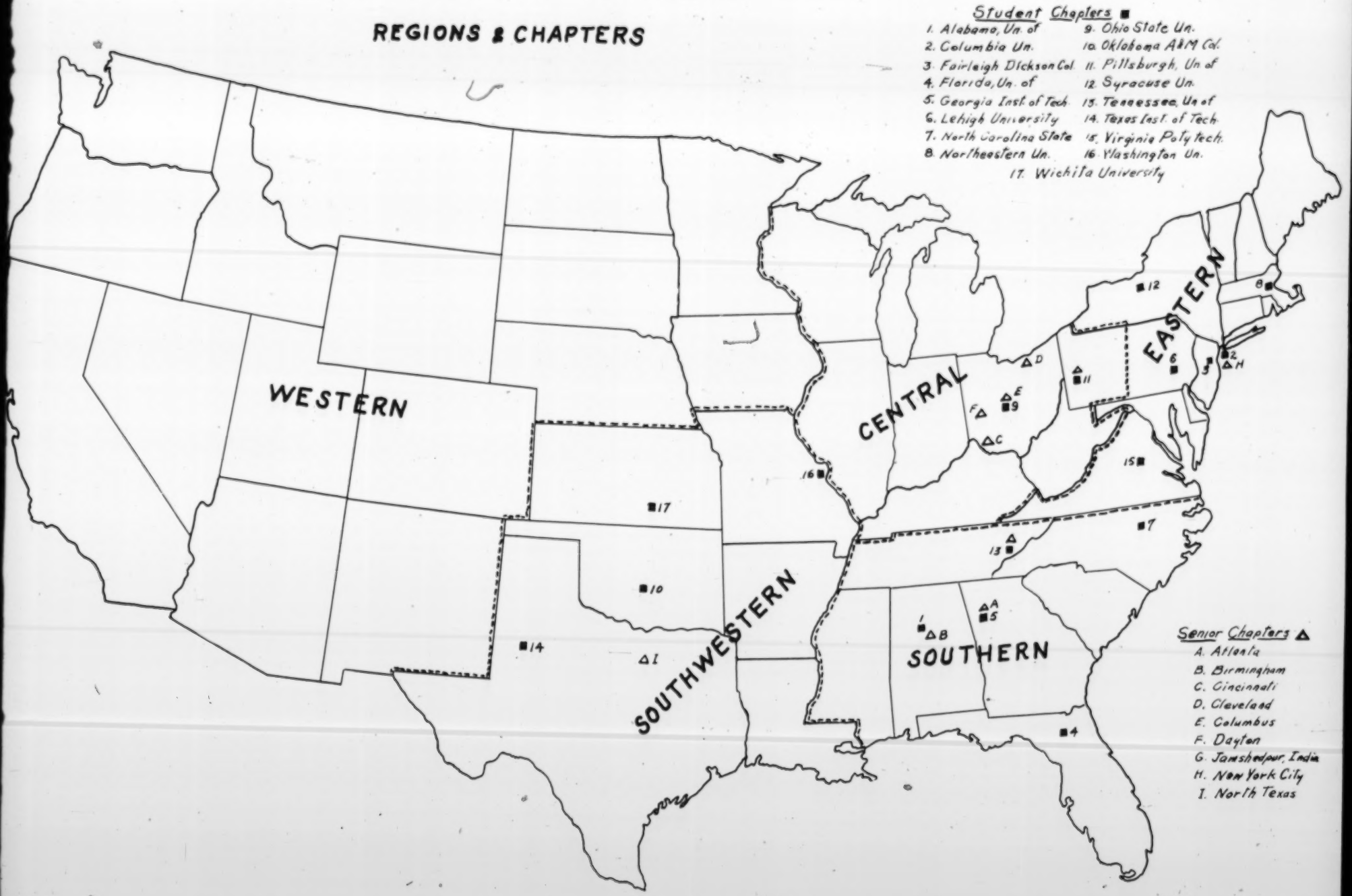

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THE COVER

High-speed stroboscopic photograph used to investigate the characteristics of forearm motion in the Rich Laboratories of Industrial Engineering, Georgia Institute of Technology. This investigation is being performed as a Master of Science in Industrial Engineering thesis by George W. Greenwood.

Notes From The Executive Secretary

It affords great pleasure to report that our Institute has made great progress, although it has been difficult to keep the widely dispersed membership aware of what is being done.

President Allen has appointed a number of new committees, listed elsewhere in this issue. It will be noted that the first seven of these are designed to render service in the field of Industrial Engineering beyond the confines of our society, thus the American Institute enters into the second phase of its operations. When we were first organized our big task was to build a strong group of Industrial Engineers qualified to represent our branch of the engineering profession, this task will, of course, never be finished, and strong efforts will be made to continue progress in this direction.

However, with our new committees we now begin to work on projects for service to the engineering profession, industry which uses the services of Industrial Engineers, and to the public in general.

All members interested in research and writing are urged to participate. Write directly to the chairman concerned with the field of your interest or to national headquarters.

Wyllys G. Stanton

A Word From The Convention Chairman

Dear Fellow Members:

Just a note to all of you to let you know that the convention committee members have not entirely worked themselves to death — they're still kicking. Your committee has worked very hard to make this Second Annual Convention a source of professional enrichment as well as relaxation and good fellowship. The nicest way in which our members can thank us for our efforts is by attending the convention and by bringing their wives or girlfriends (don't bring both!)

One of the more serious difficulties in planning such an affair is the necessity of making definite commitments with Hotel Statler as to room size and meals contracted for. Please make our job a little easier by sending your registrations in early.

Let's all be looking forward to winding up a busy year by having a fruitful, pleasant and memorable convention! I'm looking forward to shaking hands with all of you on June 16.

K. T. Korn

SHOULD WE REPLACE THIS MACHINE?

. . . by Frank M. Gryna, Jr. INSTRUCTOR OF INDUSTRIAL ENGINEERING, NEW YORK UNIVERSITY

Mike Feeney, foreman of the turret lathe department, informs us that turret lathe #21 is wearing out and requests that it be replaced.

What facts should management consider in deciding whether or not to replace the lathe? What are the elements of a machine replacement study? Our analysis can be divided into two parts—first, a study of costs and second, a consideration of the intangibles (any relevant facts in monetary units).

Considering cost, what calculations should we make to compare the cost if the present machine is retained to the cost if a new machine is purchased? The simplest method is to compare the annual cost if we keep the present unit to the annual cost if we buy a new machine. The annual cost of a machine is composed of two parts:

1. The annual cost of recovering the investment in the machine. (We shall call this the Annual Cost of Capital Recovery or A.C.C.R.)
2. The annual operating cost consisting of labor, repairs, power, supplies, space etc.

First, then, we must calculate the Annual Cost of Capital Recovery. In doing this, we will include an interest rate (i.e. a rate of return. Why is an interest rate included in the calculations? Suppose we had to borrow the money to pay for the first cost of the proposed new machine. Here, we will agree that interest should be recognized in the calculations because we must pay interest on the borrowed money. However, even if it is not necessary to borrow the money, we should still consider interest in the calculations. If the new machine is not purchased, we have the opportunity of securing a return (interest). The dollars representing the first cost of the new machine could be invested in a safe security and eventually yield a return of 1% interest. By purchasing the new machine, we are giving up the opportunity of investing the money and earning a return. Therefore, even though the money is not borrowed, interest is a cost and should be included in the Annual Cost of Capital Recovery.

The Annual Cost of Capital Recovery can be calculated from the following formula:

$$A.C.C.R. = (P-L)\ (CRF)\ in + L\ (i)$$

where: P = First cost (including installation)

L = Salvage value at the end of n years

(CRF) in = Capital Recovery Factor for n years of life and i% interest

n = Capital Recovery period

i = Interest rate (in decimal form)

The Capital Recovery Factor for various values of n and i can be found on the Chart for Capital Recovery Factor.

The following example will illustrate the calculations for comparing a present machine to a proposed machine on the basis of annual cost. We are considering the replacement of turret lathe #21 and have estimated the costs of a new machine as follows:

First cost = $20,000
Expected life = 10 years
Salvage value at end of life = $5,000
Annual operating costs:
Labor = $3,000
Repairs = $150
Supplies = $50
Power = $200
Taxes, insurance, space etc. = $100

It has been decided that we could earn 6% interest if we invested the money in a security instead of buying the new machine. From the chart, the CRF for 10 years and 6% is 0.135.
Then:

A.C.C.R. = (20,000 - 5,000) (0.135) + 5,000 (0.06) = 2,325
Annual operating costs = 3,000 + 150 + 50 + 200 + 100 = 3,500

Annual Cost = 5,825

An annual cost of $5,825 will be incurred if we buy a new machine. We must compare this to the annual cost if we keep the present machine in operation.

The cost data for the existing machine is as follows:

Original cost = $12,000
Expected total life = 10 years
Salvage value at end of total life = 0
Estimated life remaining = 2 years
Present salvage value = $3,000
Annual operating costs (for the remaining life)
Labor = $3,700
Repairs = $250
Supplies = $75
Power = $250
Taxes, insurance, space etc. = $200

First, we will compute the A.C.C.R. if we keep the existing machine. For the existing machine, the Annual Cost of Capital Recovery is computed on the present salvage value and the remaining life instead of on the original cost and the original total expected life. This viewpoint is logical because interest charges are calculated only on money which becomes unavailable by the adoption of one of the alternatives. If we keep the present lathe, we forego the opportunity of collecting the present salvage value ($3,000) and investing it somewhere to secure a return. We do not give up the chance of investing the original cost ($12,000) because we cannot collect this amount today and invest it. The present salvage value is all we can realize today for investment purposes. For this reason, the A.C.C.R. for the present lathe should be based on the present salvage value and the remaining life.

From the chart, the CRF for 2 years and 6% is 0.54.

6% is 0.54. Then:

A.C.C.R. = (3,000 - 0) (0.54) + 0 (0.06) = 1,620
Annual operating costs = 3,700 + 250 + 75 + 250 + 200 = 4,475

Annual Cost = 6,095

If the existing machine is retained, the annual cost will be $6,095. With a new machine, the annual cost will be $5,825. Therefore, a saving of $270 per year will be realized if the new lathe is purchased.

The Intangible Analysis

So far, we have compared the present machine with a new machine from a cost angle only. In addition to cost, there are other elements to consider which we cannot state in monetary units. Some or all of the following elements may have an important bearing in a machine replacement study.

1. *Quality of production.* Is the quality of the finished product from the old machine comparable to that of a new machine? Often, a superior product from a new machine may be absolutely necessary to obtain a

high sales volume. In addition, a new machine may result in less spoilage — a definite cost of production.

2. *Availability of funds.* Do we have enough money available to purchase a new machine? If funds are available, we must be sure that sufficient working capital remains after the expenditure is made. If we must borrow the money, we must consider the consequences of a failure to pay back the loan.

3. *Recovery of investment.* The length of time which we allow ourselves to recover the investment in a machine is known as the capital recovery period. In some types of machines, greatly improved models are developed every few years. If we purchase a machine today and three years from now a radically improved model is introduced, competition may force us to purchase the new model. If eight years was originally allowed to recover the investment, (capital recovery period=8 years), not all of the investment in the original model would have been recovered. If an improved model is imminent, use a short capital recovery period in the calculations. In any event, try to check the possibility of an improved model in the near future.

4. *Product demand.* It is hoped that the present demand for our product will continue in the future. But suppose our competitors develop an improved product which requires different machinery. Competition may force us to buy the new equipment necessary to manufacture the improved product. Here again, we must be careful in selecting the capital recovery period. Logically, the capital recovery period should be equal to the expected life of the machine. However, if there is a chance that the product demand may soon collapse, it may be wise to use a short capital recovery period.

5. *Capacity required.* Would it be worthwhile to purchase new equipment with a greater capacity than is presently required? If a greater capacity will be needed soon in the future, it may be more economical to purchase one large machine now rather than add supplementary units in the future. Furthermore, the ability to produce large quantities in a short time may be a deciding factor in securing customers.

6. *Labor displacement.* If a new machine is purchased, will it displace any worker from their jobs. If the need for a worker is eliminated by a new machine, another job must be found for the displaced worker.

7. *Machine flexibility.* Consider the existing machine and the new machine from the standpoint of doing different types of work. If the sales of product from a machine suddenly collapses, the machine must be capable of manufacturing a part which is in demand. Otherwise, we incur the cost of an idle machine.

8. *Machine breakdown.* If a machine breaks down in operation, an entire production line may be disrupted. A breakdown in an old machine may result in more time, expense and inconvenience than a breakdown in a new machine. Investigate the old and new machines to check for any difference in the effect of a breakdown.

9. *Safety.* Improved safety features on a new machine should be considered not only for worker protection but also for lower insurance charges.

10. *Work in process inventory.* Many new machines result in a saving in direct labor time. This saving can be indicated in the previous cost calculations. In addition, however, a saving in the direct labor time will result in a faster flow of product through the plant. In job shop work, the faster flow of product can help reduce the work in process inventory.

Too many companies use guesswork to decide whether or not to replace a machine. Until recently, industry has ignored any systematic approach towards machine replacement. Systematic procedures have been taught in the universities for many years. Systematic procedures are available — it's up to industry to use them.

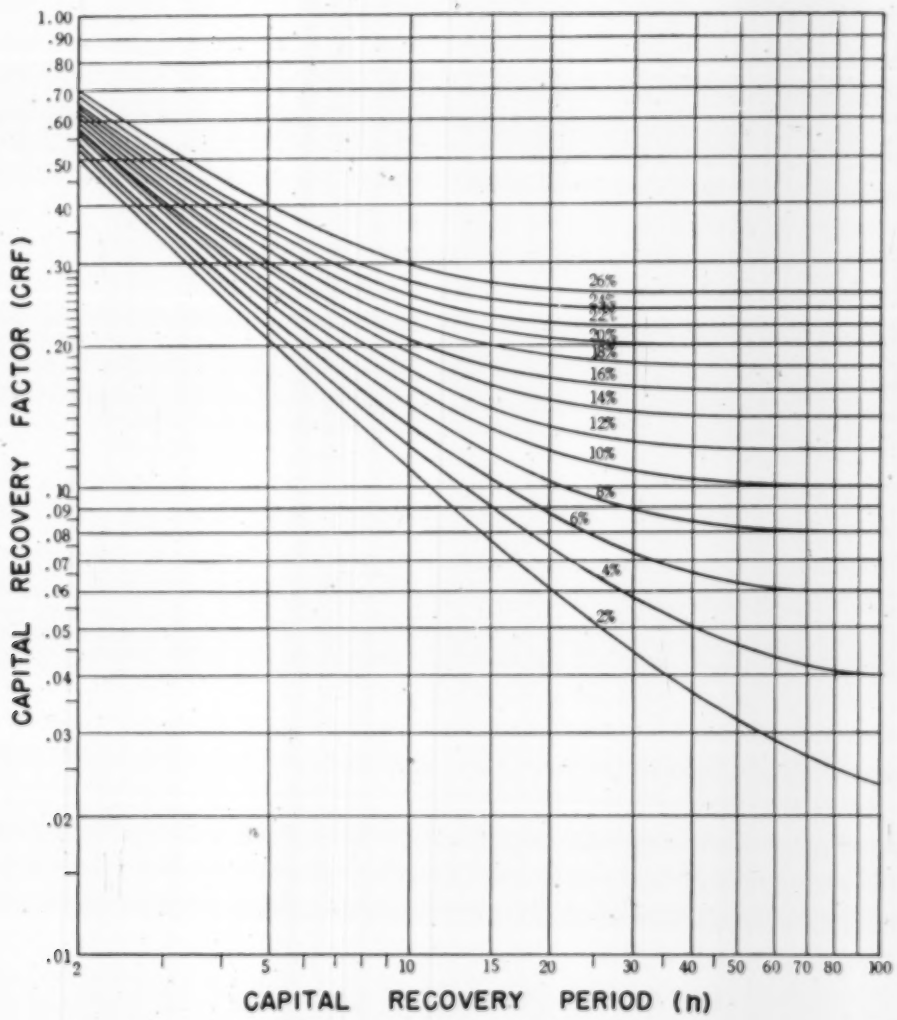

Chart for Capital Recovery Factor

"Human Engineering"

The Hallmark of Our Incentive Plan

. . . by Raymond K. Hovel

Chief Industrial Engineer, Dilts Machine Works, Division of Black-Clawson Company, Inc., Fulton, N. Y.

Mr. Hovel has engineered several wage incentive plan installations in the plants of Black-Clawson Company, Inc., the latest of which is described in this article. He has just been promoted from the position of Chief Industrial Engineer to that of Works Manager. He firmly believes, as is evidenced by this article, that "human engineering" is the master key to successful industrial engineering. This article presents a comprehensive account of the basic steps and fundamental principles involved in the installation and administration of a successful, human engineered incentive program—an actual case history showing the importance of management-labor team work.

The Dilts Machine Works — with a shop personnel of about 170 employees —is an extremely specialized plant manufacturing paper-mill converting equipment of all types. Except for a few standardized machines developed in earlier years, the company could more accurately be described as selling engineering knowledge — each customer's particular situation requiring specially built equipment. For this reason most of its productive work occurs in small quantity runs and great variety of parts — two serious obstacles to the successful application of incentives. Despite such odds and guided by a twelve year favorable incentive experience at another Black-Clawson division — Shartle Brothers Machine Company of Middletown, Ohio — the Dilts management decided in March, 1949 to try incentives. Their effectiveness has been amply proved during the past two years and has given rise to a single regret — that the decision to install an incentive plan was not made several years earlier.

The success of such a plan is not accidental. It must be purchased at the price of fair and impartial treatment of the workers, intelligent and accurate measurement of the work, and eternal vigilance against inequities of any sort brought about by careless administration. At the Dilts Machine Works incentives have resulted in a saving of 37½ per cent on all productive work, greater volume of business, better satisfied employees, greater accuracy in costs, and a greater consciousness of methods in manufacturing operations. With no limitation on incentive pay, shop-wide direct-labor premium earnings have averaged 20-22%; indirect labor 10-11%.

Preliminary Steps

Before the company's intentions were formally announced to the shop personnel, a few preliminary preparations were made by the industrial engineer engaged to carry on the project. One of these was in the form of a dual survey:

First, into the shop to observe at first hand the types of work performed, the general condition of the equipment, and the general shop practices in tooling and methods. Second, by a careful examination of the company's records to ascertain (a) the ratio of productive to non-productive personnel, (b) the activity of the company's major products, (c) the completeness and accuracy of the cost records of past performance, (d) the existing shop wage structure, and (e) the company's organizational structure and policies.

A 50-50 ratio between the productive and non-productive personnel was found to exist at the Dilts plant. This is an unfavorable ratio and it gave rise to two possible problems: the lack of participation in direct incentives of a majority group, and a top-heavy expense to be borne by measured work alone. Plans were made at once to improve the 50-50 ratio through the training and up-grading of non-productive personnel to productive jobs.

The record of activity of the companys' major products assisted the industrial engineer in determining the approximate number of time-study personnel that would probably be required to maintain adequate direct-incentive coverage.

Complete and accurate cost records of past performance were found to exist — a convenient tool in checking the incentive performance on individual operations and a reliable means for measuring the overall effectiveness of the incentive program.

The existing shop wage structure was examined in the interest of good personnel relations. The base rates were found to be consistent with the prevailing rates in comparative industries in this area. It is essential that incentive pay be used strictly as a reward for more-than-average effort, not as a loose differential to "build up" inadequate rates.

An acquaintance with the company's organizational structure and policies enabled the industrial engineer (1) to determine the proper channels through which to carry on his work and (2) to establish incentive policies consistent with the company's basic policies.

Another preparation was in the form of a series of meetings with the supervisory personnel. *This is an extremely important step in the installation of this kind of incentive program.* As number one man of the department, it is the foreman who is called upon to help "sell" the incentive philosophy to the workers, engineer manufacturing methods, instruct the workers in those methods, and help the company to obtain fair and accurate measurement of the work. With this in mind the Dilts foremen were thoroughly schooled in the mechanical details of the particular incentive system to be used and more especially in the difficulties and pitfalls sometimes encountered in such a project: resistance on the part of an employee who may have had an unpleasant incentive experience in the past; favoritism in the assignment of incentive work during the early stages of the installation; failure of the company to stand by incentive time values unless there is a definite change in method; lack of supervisory interest or attention to tooling, methods, general working conditions, or instruction of the workers with resultant unbalanced or inconsistent time values; and failure of the company to provide for incentive participation by a majority group and then to compensate proportionately those individuals who cannot practicably participate. This method of "selling" the foremen resulted in a pledge of 100% co-operation on their part to make the incentive program a success. It was further revealed to the foremen that they were to be included in indirect incentive earnings as a reward for their efforts and responsibilities in connection with incentives.

As a final preliminary step the industrial engineer prepared written description of the particular incentive system to be used at Dilts. This was for the purpose of furnishing each individual participating in the plan a simple but com-

prehensive explanation of all its essential phases: the importance and authoritative role of the foremen as methods engineer; the various methods of obtaining incentive coverage; the general categories of work included in direct and indirect incentives; the calculation of incentive earnings along with method of payment; and a few items of basic company policy, such as "no limitation on direct incentive earnings", "no cutting of a time value officially established for a given method", and "all questions concerning incentives to be brought to the attention of the foreman".

When these preliminary steps were completed an informal meeting was held with the entire shop personnel. The meeting had two important purposes:

1. to announce the company's plans for incentives
2. to introduce the industrial engineer

Pulling no punches the works manager described the company's urgent need for cost-reduction in the face of serious competition. One or two examples of attractive jobs recently "lost" served as graphic illustration of this point. He continued by expressing — on behalf of top management — the firm belief that wage incentives were one effective answer to the problem, and that a co-operative project of this sort would result not only in greater take-home pay for the employees but also in greater job security due to increased volume of business. A few words of background then served to introduce the industrial engineer who proceeded to outline the basic elements of the proposed incentive system. He was particularly careful to mention the difficulties encountered in the application of incentives to this type of highly variable work — the difficulties of coverage, methods standardization, and adequate tooling — but expressed the conviction *based on experience* that such difficulties could be largely overcome by real team work and faith. At the conclusion of a healthy, informal discussion by the group, a copy of the written description of the incentive system was given to every shop employee.

Secondary Steps

Two further steps of major importance were now taken to get the project under way.

The first was to build up a time study staff. This was done by "inviting in" three men from the shop — a skilled machinist, a foreman, and an assembler. These particular men were chosen because they possessed two important qualities:

1. a well-rounded shop knowledge
2. a reputation for honesty, fair play and good judgment

The three shop men were taught the techniques of time and motion study partly through an accelerated training course given them by the industrial engineer, partly by "on the job" training. If a wage-incentive plan is to succeed, the time study personnel must be "accepted" in the shop and must have the necessary know-how to obtain fair and accurate measurement of the work. At Dilts the fairness of the allowed time values and the complete impartiality shown the workers have enabled the time study men to "do a job" and yet be accepted as "part of the gang".

The second important step at this point was the acquisition of certain basic shop data: the machining properties of the particular grades of cast iron, steel and other materials used in the Dilts products; the capacities and limitations of the company's machine tools; tables of economical and practicable speeds and feeds; a set of standard shop practices in relation to the number of permissible cuts and amount of stock removal; and fundamental methods for general fabricating and assembly work. This information was obtained through means of experiments and tests conducted jointly by the foremen, tool department and time study department. Such data have several useful purposes:

1. As a measuring stick they enable the time study staff to evaluate work performance on a completed time study and maintain proper consistency in the time values.
2. They make possible the derivation of machine formulas and special standard data applicable to a particular line of work or set of conditions.
3. They serve as an important tool in the estimating of labor on new work for the purpose of competitive bidding.
4. They are an aid to the foreman in his important job of helping develop proper methods and then instructing the workers in the use of those methods.

Description of the Direct Plan

The Dilts incentive system is composed of two plans: the Direct and the Indirect.

The Direct Plan is one under which individual jobs are measured and individual incentive is paid to a single employee or small group. Measurement is made by time study, adaptation, and formula application. Time study alone would be far too slow and laborious in a highly specialized plant such as Dilts, but adaptation and formula application make rapid strides possible. The success of all three processes is dependent upon the consistent use of intelligent methods. And these at Dilts are principally the responsibility of the foreman. When an unfamiliar type of operation is to be covered, the operation is first analyzed by the foreman — with the assistance, if necessary, of the tooling department, general shop supervision, or time study staff. An attempt is made to determine the best conceivable method for performing the operation — the proper tooling and correct speeds, feeds and stock removal for a machining operation; the correct tooling and sequence of sub-assemblies in assembly work; and the proper holding fixtures, welding rods and weld requirements in fabrication work. *If this all-important methods engineering is not done by the company through its foremen, it will be done by the employees themselves. And that leads to loose values and inconsistencies.* After the proper method has been determined, the new operation or process is time-studied. Abnormalities are segregated as foreign elements and are adequately compensated for, along with fatigue, by a 15% allowance on *manual elements*. In addition a leveling factor is used to raise or lower the actual time spent on those manual elements to a day work pace. This factor is determined by the time study observer according to his judgment of the degree of skill and effort demonstrated by the worker during the study. The thought is constantly stressed at Dilts that good faith and co-operation during a time study pays off much better than the hold-back attitude. Examples are given to show how good skill and effort actually result in higher time allowances than does mediocre performance. An allowance of 20% or more is applied to *machine-controlled elements* after these have been properly engineered by the foreman in keeping with the basic data. Without this allowance the incentive earning possibility would be greatly reduced and the incentive program would have little chance for survival. The final step in the completion of the time study is the recording of all pertinent information on the back of the time study form. The particular form used is one developed by the Methods Engineering Council of Pittsburgh.

It the operation to be measured is similar to an operation previously analyzed and standardized in the above manner, the adaptation procedure may be used for the measurement. This involves the direct use of any directly applicable elements of the original study and the calculation by proportion or other means of any elements which are different. Adaptation, along with formula application, not only saves time but also promotes greater consistency in the allowed time values for similar operations.

Formula application is the establishment of allowed time values through the use of standard data or mathematical formulas. This has been an extremely

useful tool at Dilts in the difficult job of coverage. The formulas were developed from time studies made at the Dilts plant. In this manner they are directly applicable to the Dilts line of work and are consistent with the prevailing conditions. A few good "universal" formulas can be found in text-books, but they usually apply to standard machine tools and ideal conditions neither of which is characteristic of the typical specialized machine shop. Each formula consists principally of two parts:

1. A group of constant time values which remain the same for similar types of manual work performed under similar conditions.
2. A group of variable time values which change with each new set of conditions.

The formula may be used "at the desk" or "on the spot" depending upon the complexity of the operation. No formula is accepted for general use until it has been thoroughly tested on a variety of operations and found to provide fair and accurate time values.

Through the use of the three methods of coverage above described, the Dilts time study staff has maintained from 70 to 85 per cent incentive coverage on the operations of five departments: machine shop, assembly department, welding shop, bar and heat-treating department, and carpenter shop. An average of 700 operational time values are established per month on a broad variety of work.

Some of the Problems

The Dilts Direct Incentive Plan has not been entirely free from an occasional difficulty or problem. Occasionally a loose time value "creeps in" due to inadequate methods engineering. To date such situations have been corrected, first, by pointing out to the employees affected the unfairness of such values to the other employees, and, second, by getting their consent to have the operation restudied. The company's own good faith in "standing behind" properly established time values is unquestionably the reason for this sportsmanlike attitude. Any question that arises concerning a time value, an error in incentive pay, or any other phase of the program is handled by the foreman. He personally obtains a satisfactory explanation or correction of the situation and conveys the necessary message to the employee involved. In this manner the foreman has remained number one man of his department at Dilts and is respected as such by his workers. Carless work is subjected to a mild but effective penalty — the loss of premium earnings on the parts involved. Contrary to the oft-made assertion that incentives produce high scrap records, the amount of time involved at Dilts in bad work and its correction or replacement has rarely exceeded 3% of the total direct labor hours spent during any given week — a further indication of the fairness of the time values. During its first two years of existence the Dilts incentive program has had not a single major complaint.

Direct premium pay is computed and paid weekly as a part of the employee's weekly earnings. Due to the simplicity of this particular incentive system — a variation of the standard-hour plan — an employee can keep an accurate daily record of his premium earnings.

The Indirect Plan

In order to make incentive participation available to all shop employees, Dilts inaugurated the Indirect Plan within five months after the begining of the Direct. The Indirect Plan applies to work which is not measurable on a direct basis. Some of the jobs included in this category are: tool-making, tool-grinding, maintenance, stock handling, crane operating, crane following, shipping, sweeping, and yard work. At Dilts indirect incentives have shown their effectiveness in terms of increased interest and co-operation on the part of the indirect employees. Indirect premium pay, computed once a month, was arbitrarily set at one-half the average direct premium percentage earned on all direct premium work during the month. It is thus of advantage to the non-productive workers to help raise the percentage of direct premium earnings.. The Indirect Plan is also extended to the shop supervisory group and to the portion of measurable work not yet covered. It is felt that this fair treatment has amply paid off in the good will that prevails at this company.

Some of the Benefits

Two major benefits had been predicted for the employees — greater take-home pay and greater job security due to increased volume of business. The company proved right on both counts. The Dilts employee's earnings are high among comparative industries, and the company's strengthened competitive position has helped it to obtain certain jobs that would otherwise have been "lost". Accurate cost comparisons made during the first year of incentive operation revealed a saving of 37½ per cent on all direct labor. This means that a year and a half of productive work was shrunk into one year, with a parallel saving of a portion of the non-productive labor. To date the records indicate a saving of approximately 90,000 man-hours of labor. In addition, the company's costs are much more uniform, delivery schedules are being met, and foremen and operators alike have become methods-conscious. Finally, the employees and supervisors alike, look up to and respect *their* incentive plan.

Alpha Pi Mu

THE NATIONAL INDUSTRIAL ENGINEERING HONOR FRATERNITY

. . . by Jay Klein

Alpha Pi Mu, the national industrial engineering honor fraternity, confers membership upon those students who have shown exceptional academic interests and abilities in the field of industrial engineering. The fraternity was founded at Georgia Tech., January 25, 1949, and has had a remarkable growth, until it now has chapters at Ohio State, The University of Alabama, Virginia Polytech, New York University, Washington University, Oklahoma A and M, and Columbia. Many other colleges and universities have applied for charters, and indications are that this growth will continue until there are chapters of the fraternity at the majority of schools offering courses in industrial engineering.

Until recently, there was little need of an honor fraternity of this type; the industrial engineering profession was comparatively new, and few schools offered a degree in this field. Now, however, industrial engineering has found its place in the engineering profession, and a formal training is more necessary now, than formerly, to met industry's demand for well schooled engineers of high leadership ability. The adoption of a standard curricula called for an agency to recognize superior performance and confer commensurate honor. Accordingly, Alpha Pi Mu was founded to further the interests of industrial engineering, to create a closer student faculty relationship by bringing together the needs and thoughts of both and to confer recognition upon the student of industrial engineering who has shown exceptional interest and ability in his field.

The badge of the organization is a gold key, which consists of a triangle superimposed upon a cog wheel. On each leg of the triangle is one of the letters Alpha, Pi or Mu. The undergraduate or alumni who wears this key has shown excellence of scholarship, leadership, character, ethicality and sociability as well as breadth of interest. Membership is not confined to the student alone, however, for the charter makes provision for honorary initiation of those men who have made outstanding contributions to the field of industrial engineering.

Second Annual Convention

The Cleveland Chapter has been selected as host of the Second Annual Convention of the American Institute of Industrial Engineers, Incorporated. The convention will be held at the Hotel Statler, Saturday, June 16, 1951, in the Ohio Room on the mezzanine.

The following program has been planned for the convention. Please note that Cleveland is on Eastern Daylight Saving Time.

PROGRAM

For

SECOND ANNUAL CONVENTION

Morning

8:30-9:30 Registration
9:30 Chairman's recognition of Chapters
10:00 Developments on Industrial Engineering
12:00 Luncheon
Speaker — Ewan Clague, Commissioner, Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C.
Subject — "Productivity, Here and Abroad"

Afternoon

2:00 Business Session
Agenda
Read minutes, last convention
Old business
Treasurer's report
Standing Committee's Reports
President's Report
Tellers' Report on Election
Installation of officers
New Business
Adjournment
4:00 Committee Meetings
6:30 Banquet, Fellowship awards, music and dancing

A program is being planned for the ladies for the afternoon. Ladies will join the meeting at 6:30.

THE COMMITTEE

General Chairman —
K. T. Korn — *Edward A. Berk & Associates*
Vice Chairman —
J. F. Shuri — *Ohio Rubber Company*
Program —
M. C. Miller — *Republic Steel*
Louis Ufholz — *American Greeting Publishers, Inc.*
Technical Papers —
L. R. Grimes — *Ohio Rubber Company*
Publicity —
Joseph Terr — *Consulting Engineer*
Registration —
George J. Fisher — *Republic Steel Corporation*
Ladies' Program —
Mrs. K. T. Korn

THE SPEAKER

We were fortunate in securing Commissioner Ewan Clague, head of the Bureau of Labor Statistics. Commissioner Clague is a well-known public speaker and also thoroughly familiar with the timely subject on which he will talk. Under his direction, his bureau has conducted very extensive studies on productivity in this country and particularly in the Western European countries. The studies have been in progress since 1946 and will form much of the factual and statistical foundation of Commissioner Clague's discussion.

THE LADIES' PROGRAM

The national executive board and your convention committee were unanimous in their desire to have at least part of the convention with our ladies. All too often we let our technical and professional interests dominate the AIIE meetings and events and it is our belief that at least once a year we would like to drop the serious aspects of industrial engineering and make room for good fellowship, and some relaxation. We have therefore asked Gladys Korn to plan a program for the ladies for the afternoon, so that our wives and girlfriends will not be bored or forgotten. They will join us around 5:30 about which time we expect to adjourn our closed session.

THE ENTERTAINMENT

Starting at 6:30 we shall have music. Arrangements are being made by Clint Noble, famous entertainer and entertainment director.

THE COST

To defray the expenses of the convention a registration fee of twelve dollars ($12) will be charged to members. The fee will include all expenses inclusive of luncheon and banquet. For the ladies there will be a charge of five dollars ($5) to cover expenses of the banquet.

REGISTRATIONS

You are requested to register early. Registrations should be mailed in advance to:

GEORGE J. FISHER
369 Station D, 5610 Hamlet Avenue,
Cleveland, 27, Ohio

Please inclose your check for $12 for the men and $5 for the ladies.

HOTEL ROOMS

The Statler Hotel has set aside a block of rooms to accommodate out of town members. Please make your reservations directly with the hotel by writing to:

MR. J. L. WATSON, Front Office Manager
Hotel Statler, Cleveland, Ohio

stating type of accommodation desired, date and approximate time of arrival and checkout. Please state that you are an AIIE member to insure proper accommodations and handling.

CONSTITUTION – AMERICAN INSU

ARTICLE I — NAME

Section 1 — The name of this organization shall be the American Institute of Industrial Engineers, Hereinafter called the AIIE.

Section 2 — Each local Unit of the AIIE shall be known as a chapter and shall be called by the name of the city or county in which it is located followed by the words "Chapter of AIIE".

Section 3 — Where chapters of the AIIE are non-existent, each member shall be known as a member of the AIIE and shall be afforded the same rights and privileges as any other person belonging to the organization.

ARTICLE II — PURPOSE

The purpose of this Organization shall be:

1. To maintain the practice of industrial engineering on a professional status.
2. To foster a high degree of integrity among the members of the industrial engineering profession.
3. To encourage and assist education and research in areas of interest to the industrial engineer.
4. To promote the interchange of ideas and information among members of the industrial engineering profession.
5. To serve in the public interest by the identification of men qualified to practice as industrial engineers.

ARTICLE III — CODE OF ETHICS

The code of ethics of the AIIE shall be the Canons of Ethics of the National Society of Professional Engineers.

ARTICLE IV — MEMBERSHIP

Section 1 — There shall be four classes of membership:

A — Student
B — Junior
C — Active
D — Fellow

Only fellows, active, and junior members shall be entitled to vote and hold office.

Section 2 — A. Student members shall be regularly enrolled students of accredited curricula in industrial engineering. Student members may transfer to junior membership upon graduation.

B. Junior members shall be engineers-in-training engaged in industrial engineering work or graduates of engineering curricula accredited by the ECPD and engaged in industrial engineering practice. Junior members may transfer to active membership upon receipt of their professional license or upon the attainment of five years of professional industrial engineering experience.

C. Active members shall be state licensed professional engineers engaged in industrial engineering practice or other persons who can present proof of long experience in industrial engineering practice.

D. Fellows shall consist of a small group of outstanding leaders in the profession, who are to be honored by being elected to this grade of membership. Fellows must have given at least 15 years of service to the industrial engineering profession and shall be selected by the executive council and approved by the National Convention. Not more than five percent of the total membership is to be admitted to this group during any one year, the total number never to exceed ten percent of the membership. The start of this group is left to the discretion of the Board of Trustees.

Section 3 — Any member may withdraw from the AIIE any time by sending a formal statement to that effect to the executive secretary. In event of withdrawal any refund of unexpended dues will be waived.

Section 4 — Any member neglecting to renew his membership by the payment of dues is to be carried on the rolls for an additional 45 days, during which time he is to receive a notification from the executive secretary that his membership has lapsed. If his dues have not been received at the end of this period the member's name shall be dropped from the rolls. Any member so dropped can rejoin the AIIE by sending in a new application.

ARTICLE V — ELECTION OF MEMBERS

Section 1 — Persons who wish to join the AIIE and who feel that they have the required qualifications shall apply by filing an authorized application blank, obtainable from the national office, with the executive secretary.

Section 2 — After reviewing the applicant's qualifications, the membership committee will confer or withhold membership in the AIIE subject to the approval of the Board of Trustees. The membership committee shall consist of three members appointed by the president with the approval of the Board of Trustees.

ARTICLE VI — CHAPTERS

Section 1 — There shall be two classes of chapters, namely active and student.

Section 2 — Active chapters shall consist of ten or more regular members (fellows, active, or junior) of the AIIE who have been granted a charter upon application to the Board of Trustees.

Section 3 — Student chapters shall consist of ten or more student members of the AIIE who have been granted a charter upon application to the Board of Trustees.

Section 4 — Each student chapter at the beginning of each school year, shall appoint an advisor from the faculty of their university. This advisor, who shall be known as the honorary chairman, shall be a regular member of the AIIE. No advisor shall serve for more than two consecutive years.

ARTICLE VII — ORGANIZATION

Section 1 — The National organization of the AIIE shall consist of an association of all the members, divided into regions, as specified by the execu-

tive committee.

Section 2 — The legislative body of the AIIE shall be the national convention and shall consist of the national officers, delegates from the various active chapters, and one delegate-at-large from each region for every 100 members or fraction thereof. The delegate-at-large, who will represent the members who are not affiliated with chapters, shall be appointed by the vice-president of the region no less than 30 days before the meeting of the national convention. Each chapter shall be entitled to send one voting delegate. The national convention shall meet every year at such time and place as shall have been determined by the Board of Trustees.

Section 3 — The national officers of the AIIE shall be as follows: President, Executive Secretary, Assistant Executive Secretary; Treasurer, two board members-at-large, and one vice-president from each region who shall serve as deputy of that region. *These officers shall constitute the board of Trustees of the AIIE.* All officers except the Board members-at-large shall have terms of office of one year. The board member-at-large shall serve two years. The officers shall carry such duties as are customarily connected with their offices and such additional duties as may be assigned to them by the national convention.

Section 4 — A slate of officers, excluding the vice-president, for the AIIE shall be drawn up yearly by a nominating committee consisting of the vice-presidents. At least two and not more than three names shall be put up for each office.

fice. Officers shall be elected by a mail vote of the entire regular membership, the ballots being distributed and counted by the executive secretary. Until such time as there are at least three vice-presidents, the board of trustees shall constitute the nominating committee.

Section 5 — The vice-president for each region shall be elected at the same time as the remaining national officers by the entire regular membership of the region in which he is to serve. At least two and not more than three names for this office shall be drawn up by a nominating committee consisting of the chapter chairmen and the delegate-at-large from the region. The nominating committee will count the ballots. The retiring vice-president will be responsible for the preparation and execution of the election.

Section 6 — *The president, executive secretary, assistant executive secretary, treasurer, and retiring president shall constitute the executive committee,* and shall have the duties and powers delegated to it by the Board of Trustees.

Section 7 — Vacancies in the Board of Trustees which may occur in the interim between elections shall be filled by that board. Members so elected shall serve until the next election when the remainder of the term shall be filled by action of the regular membership.

Section 8 — The Board of Trustees shall exercise powers of the National Convention in the interim between conventions subject to such restrictions as may be imposed by any convention and to the provisions of this constitution.

Section 9 — The organization, time of meetings, committees, etc. of the Board of Trustees and the Executive committee shall be left to the discretion of these two bodies respectively, provided that nothing in this section is construed as conflicting with any other section of this constitution.

Section 10 — The vice-presidents shall supervise the chapters in their respective regions and shall arrange for regional conferences as stated in the by-laws.

Section 11 — The assistant executive secretary shall assist the executive secretary and have additional duties as may be delegated to him by the Board of Trustees.

Section 12 — A quorum for the National Convention shall consist of those present. A quorum for the Board of Trustees shall consist of two-thirds of its membership.

Section 13 — The executive secretary, at the close of each fiscal year, shall draw up a budget for the coming year to be presented to the Board of Trustees for approval.

Section 14 — Any necessary action pertinent to the proper functioning of the financial status of the AIIE shall be taken by the Board of Trustees.

Section 15 — The National Convention, upon recommendation of the Board of Trustees, may provide for financial compensation to any officers or employees of the AIIE.

ARTICLE VIII — LOCAL POWERS

Section 1 — Each chapter shall have complete control of all matters of local concern under such restrictions as may be imposed by this constitution, the by-laws, or the national convention. In no case shall such powers be exercised contrary to the ideals and purpose of the AIIE.

Section 2 — Each chapter shall be required to submit to the Board of Trustees for its approval its constitution, by-laws, and any amendments which may be enacted from time to time.

Section 3 — The officers of each chapter shall be the chairman, vice-chairman, secretary, and treasurer. When desired, the two latter officers may be combined. All officers of the chapter shall be elected at some convenient time subject to the provisions of the chapter's constitution and by-laws.

ARTICLE IX — SUSPENSION AND EXCLUSION

Section 1 — Any member convicted by the chapter to which he belongs of conduct unbecoming to a gentleman and to a member of his profession shall be dismissed and deprived of his membership. The justified withdrawal of an engineer's state license might be construed as a case to apply in this article. Such exclusion requires

a three-fourth vote of all of the members of the chapter in which the proceedings were initiated and shall be reviewed by the Board of Trustees before it becomes effective.

Section 2 — The Board of Trustees may expel for cause, any unaffiliated member of the AIIE, provided this member is given the opportunity to answer the charges pending against him before final action is taken.

Section 3 — The National Convention shall have the power, by a three-fourth vote, to withdraw or suspend the charter of any chapter for cause upon the recommendation of the Board of Trustees, provided that the delinquent chapter shall have been given due notice that such action will be recommended. This notice shall be accompanied by a statement of the charges pending against the chapter and the chapter shall be given the opportunity to reply to these charges before final action by the convention.

ARTICLE X — SPECIAL CONCESSIONS

Section 1 — The Board of Trustees, upon careful consideration and by unanimous consent of all board members, may grant a chapter exemption on from rules and regulations passed for the AIIE as a whole for a limited time. This grant shall be revoked when the existing conditions no longer warrant this consideration.

Section 2 — The Board of Trustees shall be empowered to call special meetings of the National Convention whenever existing conditions warrant such an action.

ARTICLE XI — BY-LAWS

The Board of Trustees, by a three-fourth affirmative vote, shall have the power to pass, repeal, or modify any by-laws pertaining to matters not expressly specified in this constitution.

ARTICLE XII — AMENDMENTS

Section 1 — Amendments to this constitution may be proposed by any one regular member of the AIIE or by the Executive Council.

Section 2 — Any amendment shall require for its passage a three-fourth affirmative vote of the National Convention.

Section 3 — A copy of the proposed amendment shall be sent to each regular member by the executive secretary at least sixty days before the National Convention.

Section 4 — If desired, a mail vote on a proposed amendment may be taken by the executive secretary. In this case, ballots shall not be counted for sixty days after the mailing, date, and the affirmative vote of a majority of the entire regular membership shall be required to amend this constitution.

ARTICLE XIII — EFFECTIVE DATE

Section 1 — This constitution shall become effective upon ratification by a simple majority of the charter membership.

Section 2 — A charter member shall be defined as a member on the rolls of the AIIE at the time the constitution is mailed for the vote.

BY-LAWS

ARTICLE I -- AWARDS

A distinguished service award of appropriate design may be awarded to any member of the AIIE who, in the eyes of the National Convention that makes the award has rendered some outstanding service to his profession. No more than one award shall be made at any one convention. Nominations for this award must be submitted to the executive secretary either by chapters or by regular members at least five months before the date of the Convention. The executive secretary will present the nominations to the Board of Trustees which will make a recommendation to the National Convention.

ARTICLE II — COMMITTEES

Standing committees of the AIIE shall be: Executive and Membership, as defined in the Constitution, Professional practices, and education. All standing committees except the executive committee, and all other committees shall be appointed by the president and shall perform such duties as may be assigned by him.

ARTICLE III — SPECIAL DUTIES

Each vice-president shall check the activities of the chapters in his region and present an annual report to the Executive secretary. In addition, he shall arrange for a regional conference and he shall encourage a large turn-out of the unaffiliated membership. He shall present a brief, written report on his region to the National Convention.

ARTICLE IV — BOARD OF TRUSTEES

Section 1 — Any regular member of the AIIE is eligible to become a member of the Board.

Section 2 — The Board shall hold at least one meeting a year, the expense of such a meeting being paid from the funds of the National Treasury.

Section 3 — The Board of Trustees shall be the administrative body of the AIIE and may delegate duties to the executive committee.

Section 4 — The National President shall prepare a detailed report to be presented to the National Convention every year.

Section 5 — The Board of Trustees shall have such powers as are necessary to the proper functioning of the AIIE, provided that nothing in this section shall be construed as contrary to the constitution, by-laws, and ideals of the organization.

ARTICLE V — FINANCE

Section 1 — The fiscal year shall be the calendar year.

Section 2 — The dues shall be as follows: student members, one dollar; junior members, two and one-half dollars; and active members, five dollars per year. The initiation fee for all regular members shall be two dollars with the exception of student members who, upon graduation, may transfer to junior membership by paying student dues for one additional year.

ARTICLE VI — MISCELLANEOUS

Section 1 — Robert's Parliamentary rules of order shall be the standard authority for all business transacted.

Section 2 — Reports shall be made by every officer of the AIIE whether National or local, whenever required to do so by the Board of Trustees. Each chapter chairman shall prepare a report for presentation to the National Convention.

Section 3 — The expenses of the Board of Trustees shall be paid from the treasury as directed by that Board.

ARTICLE VII — AMENDMENTS

These by-laws may be amended at any time by a three-fourth affirmative vote of the Board of Trustees. Any amendments adopted shall not become effective for a period of thirty days.

Respectfully submitted,
Constitution Committee
Walter H. Friedlander, Chm.
Joseph Myers
Thomas Kenan

Finances Of The Institute

Because of pressure of other engagements the firm of Certified Public Accountants who audited the records for the year ending March 31, 1950, has not yet been available. Nevertheless it has been decided to publish the statement prepared by our own accountant. Last year no changes were made by the independent auditor.

All money received is deposited in the Huntington National Bank of Columbus. Disbursements are made only on cheques signed by the treasurer, or in emergencies by the Executive Secretary. Both men are under fidelity bonds payable to the A.I.I.E. It will be noted that records are kept on a strictly cash basis and furniture, fixtures and office machinery worth $450.00 is not shown. No officer receives any compensation.

American Institute of Industrial Engineers
FINANCIAL REPORT

Receipts and Disbursements

	12 mos. ending March 31, 1951	3 mos. ending March 31, 1951
RECEIPTS:		
Initiation Fees	$ 194.00	$ 52.00
Junior Dues	549.65	330.65
Senior Dues	1,002.50	437.50
Student Dues	1,363.60	316.60
Pins	223.00	66.75
Certificates	5.00	
Miscellaneous	277.32	9.98
TOTAL	$3,615.07	$1,213.48
DISBURSEMENTS:		
Telephone	$ 42.46	$ 7.96
Supplies	455.97	127.45
Rent of Office	200.00	75.00
Clerical salaries	1,461.00	244.20
Postage	250.86	90.09
Refunds, rejected applic.	40.00	12.50
Pins	157.49	70.55
Printing (incl. Journal)	742.54	
Miscellaneous	232.55	26.71
TOTAL	$3,582.87	$ 654.46

Position

Cash in bank, subject to cheque	$1,537.83
Cash in office petty cash fund	3.42
TOTAL	$1,541.25
Less accounts payable 3/31/51	107.10
Cash available for operations	$1,434.15

National Committee Organization

President Robert E. Allen has appointed eleven national committee chairmen and some of the personnel of a number of them. Other members who are interested in any particular committee work are requested to notify National Headquarters. The committees and present personnel are as follows:

1. *On Synthetic Time Systems*
   Chairman Mr. K. T. Korn, 610 Nat'l. City Bank Bldg., Cleveland 14, Ohio; Mr. Herbert K. Dowler, 511 Thayer Ave., Ashtabula, Ohio; Mr. L. M. Ulholz, Am. Greeting Publishers, 1300 West 78th St., Cleveland 2, Ohio.
2. *On Industrial Safety & Accident Prevention*
   Chairman Mr. Jack Mims, 1327 Wood St., Dallas, Texas; Mr. Hugh Monroe, Dist. Safety Engr., Abilene Dist., Texas Employers' Insurance Ass'n., Dallas, Texas; Mr. George D. McCeney, 300 Insurance Bldg., National Surety Corp., Richmond, Va.
3. *On Statistical Quality Control*
   Chairman Mr. Joseph Movshin, Wagner Electric Corp., 6400 Plymouth Avenue, St. Louis, Mo.
4. *On Production Control Systems*
   Chairman Prof. C. B. Foos, School of Industrial Engr., Georgia Inst. of Technology, Atlanta, Ga.; Mr. G. T. Mitchell, 19 Dover Rd., Long Meadow, Mass.; Mr. Norman V. Gomes, 716 West State St., Trenton 8, N. J.
5. *On Materials Handling & Handling Costs*
   Chairman Lt. Col. John D. Day, School of Industrial Engr., Georgia Institute of Technology, Atlanta, Ga.; Mr. Dominic C. Giovinazzo, 663 West Highland, Ravenna, Ohio.
6. *On Industrial Engineering Terminology*
   Chairman, Mr. Richard J. Bess, 1415 East Washington, South Bend, Ind.
7. *On Application of Industrial Engr. Techniques to New and Unusual Fields*
   Chairman not yet appointed.
8. *On Membership*
   Chairman, Mr. Jas E. Shondell, 2531 No. 4th St., Columbus, Ohio.
9. *On Registration*
   Chairman, Mr. Jos. C. Nichels, 3245 Lubbock St., Ft. Worth, Tex.
10. *On Chapter Organization*
    Chairman, Mr. Paul R. Grady, Portsmouth, Ohio.
11. *On Public Relations*
    Chairman, Mr. Sam D. Lockskin, 490 Crescent Rd., Mansfield, Ohio.

It is expected that the committees will work toward standardization of Industrial Engineering practice in their respective fields. The program will take long; not to complete, for the work will never be completed, but to make significant progress. No doubt interim reports and monographs will be published.

Dues Increased

All members are reminded, as reported in the last issue of the News Letter, the By-Law covering dues was changed, effective May 1, 1951. The current rates are as follows:

Student Dues	$2.00 per year
Junior Dues	5.00 per year
Senior Dues	10.00 per year

The initiation fee still remains at $2.00. All members pay dues only for the actual time they belong as Student dues are pro-rated if collected after Dec. 31st so that all student memberships expire on Sept. 30th. Junior and Senior dues are either pro-rated (certain chapters collect their national dues) or mature on the anniversary date of the membership.

Readers who have examined the financial statement elsewhere in this issue will observe that during the last fiscal year receipts exceeded expenditures by only $32.20. At the same time a number of projects which members have requested have been delayed due to lack of funds.

In addition to these reasons is the fact that rising costs of all goods and services required to operate the Institute made it imperative for the Board of Trustees to obtain more income. Many members recognized this problem and suggested that AIIE dues were too low in relation to its objectives and to the charges of other technical professional societies.

WHAT IS STATISTICAL QUALITY CONTROL?

. . . by Ralph A. Hefner

DEAN, DIVISION OF GENERAL STUDIES, GEORGIA TECH

Most articles on statistical quality control are written to instruct the potential user in the techniques and mathematics of the subject. Dr. Hefner's discussion, however, deliberately departs from this approach and devotes itself to a simple, highly informative description of the basic principles, the reasons for their use, and the advantages thereof.

Many industries, both large and small, are already thoroughly acquainted with statistical quality control. Having used it in their plants for several years, they have verified for themselves the startling results that can be obtained by applying statistical principles to the control of the quality of their products.

Other industries, however, have heard only vaguely that a new technique has been developed for the control of product quality. These are the industries that are now asking the question, "What is statistical quality control"?

When a person asks this question, he is, in most instances, asking to be told what statistics has to do with the control of quality. It does not occur to him that his ideas of "quality control" may also need clarification, yet it often happens that the use of statistics in the control of quality is difficult to understand simply because no clear agreement has been reached as to what is meant by "quality control" itself.

One cannot thoroughly understand statistical quality control until an agreement is reached as to what is meant by "quality", then, what is meant by the "control of quality."

What Is Quality?

What does the word "quality" mean when applied to a manufactured article? It requires only a moment's reflection to realize that when one speaks of quality, one may be speaking of a great many different attributes. A characteristic that would be regarded as of vital importance in one manufactured article may be a trivial characteristic in another.

In the manufacture of a crank shaft for an internal combustion engine, certainly, the diameter of the shaft is of vital importance. On the other hand, in the manufacture of an aspirin tablet, the exact diameter of the tablet is immaterial, but the weight of the tablet is of prime importance.

So it is with every manufactured article. There are always one or more characteristics that are of vital importance if the article is to be judged of good quality. This importance characteristic—whether it be the length of a valve stem, the diameter of a bolt, the weight of a powder charge, the tensile strength of cotton yarn, the life span of a tire, the crushing strength of concrete, or any other desirable quality — is what a manufacturer tries to build into his product.

Specifications

Before production begins, the desired quality characteristics should be decided upon and then should be written into the specifications. The description of the article to be manufactured is in actuality the description of the *ideal* article desired, and it is the manufacturer's task to make his product as nearly identical to the ideal article as is practical and profitable.

Actually, of course, no manufactured article is *exactly* like the ideal article specified. One may wish to make a bolt 20 mm. in diameter, but, no matter how much care goes into its manufacture, the actual diameter is never *exactly* 20 mm. In fact, in spite of all that one can do, no two manufactured bolts selected at random ever have exactly the same diameter.

Here is a fundamental truth that must constantly be kept in mind. No matter what the desired characteristic of the article which one is trying to manufacture, it is inevitable that this characteristic will vary from article to article. There is always a certain amount of variation present, be it little or great. The fact that no two articles can ever be made exactly alike is inescapable, and one is forced to be content to make them as nearly alike as possible.

Variation

Obtaining manufactured articles of good quality, then, simply means that variation in the quality characteristic desired is being held within certain acceptable limits.

With this idea of quality thoroughly in mind, it is not difficult to agree on what "control of quality" should mean — that the amount of variation in the desired characteristic is to be held within as narrow limits as is practical or economical.

The fundamental ideas expressed thus far are so important that they can profitably be restated briefly. Inherent in every manufacturing process is a certain amount of variation. The amount of this variation depends upon the process itself, and it is the control of this variation that determines the quality of the finished product.

Two kinds or types of variation are found in manufacturing processes: *random variation* and the *variation due to assignable causes.*

To the statistician, random variation means that the process is operating under *a constant system of chance causes.* Stated more simply, random variation may ful to the manufacturer—random variation which can be regarded as usual or normal for a process when that process is doing the best that it can. Stated a third way — one perhaps more meaningful to the manufacturer-random variation is caused by so many and varied factors that it would be futile or uneconomical to attempt to find them.

Variability due to assignable causes means exactly what it says. There is present a cause of variation that can be sought for profitably and, when found, can be economically removed. Obviously, this latter type of variation can be controlled, and, just as obviously, the former cannot. Therefore in any instance the question always arises: "Does the process as it is now operating contain both types of variation"?

Use of Statistics

It is precisely at this point that the science of statistics enters the picture. It is the tool that differentiates between the two types of variation and it tells one when the cause of variation can be found and eliminated and when to let the process alone because it is doing the best that it can.

Statistical control of variation, therefore, deals with a quantitative measure of variability. It tells when the variation is large enough for a profitable search to remove the cause, or when it is small enough to let it alone. Statistical quality control gives one an objective rather than a subjective judgment of the variation that can be regarded as usual for any given process.

It is this fact that gives statistical quality control much of its power and usefulness. By its aid, an inexperienced foreman can judge a manufacturing process as well as the foreman with years of past experience to call upon. In fact, it frequently happens that the use of statistical quality control surprises the older foreman by showing him that his past experiences are not always an infallible guide. One instance of this might be of interest.

During the war, an old, established firm converted its plant to the manufacture of many of the various parts that go into an airplane engine. The chief engineer was responsible for the control of quality in this plant, and hearing of

statistical quality control, he availed himself of the first opportunity to take a course in which the subject was taught.

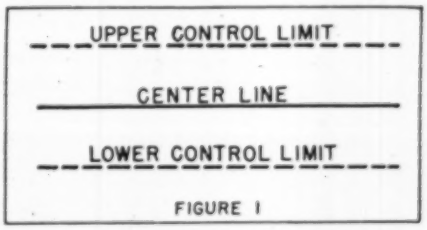

FIGURE 1

Returning to his plant, he thought of several processes that he knew were not operating at their best and hoped that his new knowledge would help him to locate and eliminate the troubles. However, his training in statistical quality control had not been very intensive, and he did not feel that he knew enough about it to apply it to a process in which he knew there was trouble. As a start, and in order to gain experience with statistical quality control, he decided to apply its principles to a process that had never given him any trouble. It was true that the process was turning out some unacceptable pieces, but the scrap amounted to only five per cent of total production, and he knew that the output of all other firms manufacturing this same item was running as high as eight and ten per cent scrap. In addition, his previous experiences in making such items told him that it was unusually good to have only five per cent of the items fall outside the close tolerances allowed. In short, experience told him his process was doing the best it could and that it needed no further attention.

Applying the analysis of statistical quality control to this process, he was amazed to find in actulity the process was not doing the best that it could. Upon investigation, he found that the parts in question were being made on four automatic machines and that an endless belt brought the finished articles to an inspection table where each was examined and the five per cent not conforming to specifications were discarded. By inspecting the output of each of the machines separately, he found that all the bad pieces were being turned out on one machine. This machine was immediately taken out of production and dismantled. A defective part was found, and, when it was replaced, the machine no longer produced articles that did not meet the specifications.

The above illustration is typical. As long as the judgment of a given process is subjective rather than obpective, there is always the danger of deciding that the observed variation in quality is random, when in reality it contains variation due to assignable causes.

Control Charts

To determine objectively the type of variation that is occurring in any given manufacturing process is relatively simple. This is done by constructing what is known as a "Shewhart control chart." To construct such a chart, one carefully examines a number of products of the manufacturing process under observation. A few simple statistical calculations are then made, and the chart is drawn, usually taking the form shown in Figure 1.

The solid line down the center is known as the *Center Line* and represents the average quality of the characteristic being manufactured. The dotted lines appearing on either side of the central line are called *Control Limits* and represent the extreme limits to be expected in the manufactured characteristic if the process is doing the best it is capable of doing. After the lines are drawn on the chart, the actual results of the manufacturing process are plotted as points. Each point usually represents the average quality observed in five selected samples.

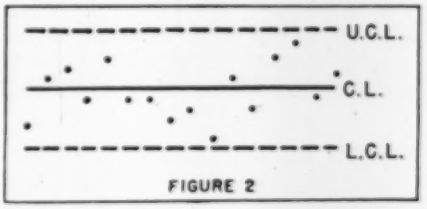

FIGURE 2

If all the points represents actual production fall within the dotted line, as shown in Figure 2, the process is said to be under *statistical control*. This means that the variation in quality is completely randóm, or that the process is operating under a constant system of chance causes. No amount of minor adjustment or tinkering with the process will affect the quality of the product; in short, the process is operating at its best.

If, however, some points fall outside of the control limits, as is the case in Figure 3, the process is said to be out of statistical control and is not turning out products of as good a quality as it is capable of manufacturing, meaning that there are one or more assignable causes of variation present. To one familiar with the manufacturing process, it is usually a relatively simple matter to search for and to find these assignable causes of variation. Once the cause of variation is discovered, it can then be eliminated, with resultant improvement of the product. If all such assignable causes of variation are removed, then all the points representing future production will fall within the dotted control lines.

It is well to point out here that the control limits — the dotted lines that differentate a process that is doing the best it can from a process that is not — are not placed on the chart arbitrarily, nor are they the results of some individual's opinion. These dotted lines are determined by the process itself. It is as if one went to the manufacturing process and asked it, "What kind of work are you capable of doing?"

"The dotted lines," would be the answer. The process in effect says, "This is what I am capable of doing. When I am operating at my best, all my production will fall between these two dotted lines."

As long as a manufacturing process is out of statistical control, there is no way of predicting what the quality of any future production will be. There is only one way to assure quality from such a process; it is necessary to inspect each and every article manufactured in order to discover and to discard those whose quality characteristics fall outside the acceptable limits.

On the other hand, if a manufacturing process is under statistical control, as illustrated in Figure 2, then one can safely assume that all future production will fall within the control limits. In such a case, all that is necessary for one to do to assure the quality of future production is to take a sample from the process at convenient intervals to see that the process is remaining in control.

It is this statistical fact that has been of so much value to manufacturers using statistical quality control. Once their manufacturing process has been brought under statistical control, inspection is reduced to a very small fraction of what it was before statistical control was established. In many instances, this has resulted in a tremendous saving, since the manufacturer's cost of inspection has been greatly reduced while at the same time the quality of his finished product has been assured.

Specification Limits

After a manufacturing process has been brought under statistical control, two other lines representing the *specification limits* can profitably be placed on the control chart for individual items. If it should happen that the specification limits fall outside the control limits, as illustrated in Figure 4, the manufacturer can rest assured that all of his production will meet specifications, and he

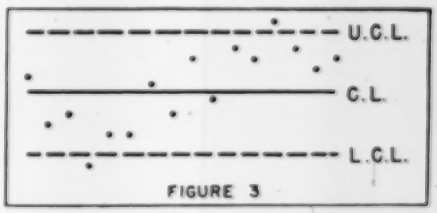

FIGURE 3

(Continued on page 17)

Book Reviews

MANAGERIAL ENTERPRISE

by Oswald Knauth
W. W. Norton, 1948

Reviewed by Professor Robert T. Livingston, Head, Department of Industrial Engineering and Management, Columbia University

This is an interesting and perhaps important book. Important not so much for what he actually proves — as the text does not prove the theory — as for what it suggests. The theory is that here in America we have developed a new economic system that differs so much from "free enterprise" on the one hand, or monopoly on the other, that the theories evolved from attempting to adapt them are not very revealing.

Having in effect stated this, he spends most of the book in a description of the "new" system. The description is not very convincing as most of the things he describes seem to be but logical derivatives — this of course does not destroy his theory but he does not anywhere categorically set up his points.

Toward the end he poses some questions and problems which must be solved but these are not very coherent or well organized.

Mr. Knauth feels that the title "free enterprise" is no longer valid and that what we have is a system of managerial enterprise. To start, this is somewhat like Burnham's concept. It is of course true that, in the development of the modern large corporation, the owner no longer occupies the position that he previously did. The owner is no longer the manager and the manager while, of course, owing a debt to ownership is no longer under the complete dictation of ownership that he used to be. This has bad as well as good points. The question naturally arises as to whether management under no direct compulsion and only concerned with retention of its own position will be wiser or more competent than under other stimuli. All of this leads rather obviously to the field of government management. Just what is the difference?

Mr. Knauth seems to feel that the stimulus is a continuation of authority and one must naturally ask whether that is good or bad.

He stresses:

(a) the increased size and specialization of capital equipment
(b) its value can only be extracted over a relatively long period of time
(c) long time continuity of the association
(d) the necessity for long time planning
(e) tendency to "control" from raw material to consumer

He says that in a "free enterprise" system costs can be estimated with a relatively high degree of accuracy and the assumption follows that they cannot in a "managerial enterprise" system, largely because of the problem of "allocation' which involves assumption.

Our present system, that Knauth calls "managerial enterprise" does not fit into the logical pattern of monopolistic competition derived from the theory of monopoly or from the concept of imperfect competition which is derived from the theory of free enterprise.

Competition has its strange aspects. While Macy and Gimbels are rivals yet either would suffer if the other went out of business.

The theories of free enterprise and the theories of monopoly have little to offer in the solution of this problem.

He poses certain questions which he says must be answered:

1. Is competition desirable and if so, to what extent? Is it socially possible to permit large units to be ruined?
2. To what extent can production be controlled to coincide with consumption — thus reduce boom and bust tendencies?
3. How about size?
4. How should management be selected and how controlled?
5. Are government corporations such as the T.V.A. desirable as yardsticks or should government actually subsidize competition?

This book is well worth reading but it is doubtful if it will help solve any problems.

THE SCIENTIFIC APPRAISAL OF MANAGEMENT

by Jackson Martindell
Harper and Bros.; N. Y., 1950 — 278 pages and appendix

Reviewed by Robert Teviot Livingston, Professor of Industrial Engineering and Management, Columbia University.

Mr. Jackson Martindell, President of the American Institute of Management has written an interesting book which distills his long professional experience into fourteen chapters starting with a definition of the general problem and successively proceeding through many of the important areas and aspects of management ending with a summary which he calls "The Principles of Excellent Management." Except for the lack of references and citations, this book could well serve as a text for a valuable graduate course in a Department of Industrial Engineering.

The title is unfortunately misleading. One expects that a method will be submitted by which the management of an enterprise can be objectively measured and evaluated. While an excellent appendix presents "Management Audit Material" and the appendix is labelled "The Objective Method of Management Audit", the scoring system submitted is entirely arbitrary and the method of determining the score completely subjective. Similarly, throughout the book, few if any actual "measures of management" are submitted; certainly none that can actually be quantisized and this in spite of the challenging statement on Page VIII of the Preface:

> ". . . the problem . . . is . . . one of devising means whereby the special qualities of individual managements can be measured"

If this is the problem, and it is, then the author never really faces it. Occasionally he approaches it and in his final chapter he makes some summary generalizations but he never comes out and says "This management is better than that management *because* . . . ."

Part of the faults lies in the adherence to the now outmoded case system and his refusal to generalize. However, the cases used are excellent, usually two differing considerably are presented and the reader cannot help but draw many conclusions from the material submitted, in spite of the absence of the author's conclusions.

The problem considered is definitely *Top Management* and the accent is on major decisions and how they are arrived at. Each case is presented clearly and the matters which must have influenced the decision and the possible results of alternative decisions are presented. This method and the covering explanations and generalizations draw the reader into the problem so that he gets the feeling of understanding and actually participating in the decision. It is this that lends an air of reality which is so lacking in most books on the subject. The chapter on research is excellent, this alone making the book worth-while reading.

Perhaps one of the most interesting aspects of the book is the challenge to management which is presented. According to the author, the decrease of production per worker and the rising cost of production is not blamed upon the worker, or upon the "decay of the social system," or the unreasonable demands of organized labor but squarely where it belongs on uninspired and incompetent management. In a word, it is "stupidity" not "cupidity" which is to blame. Ownership, due to its increasing diffusion has little influence, directors are generally too old, too conservative and too uninterested in the real problems of the companies. Who then is to be blamed and who must grow up? It is obvious: Management!

STATISTICAL QUALITY CONTROL

(Continued from page 15)

may stop all inspection except for an occasional check to see that the process is remaining in statistical control.

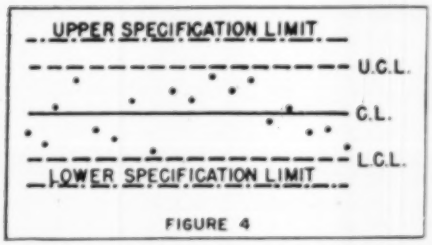

FIGURE 4

Should the specification limits fall within the control limits, as illustrated in Figure 5, this presents altogether another problem. First, one must remember that the process is under statistical control, so that, even though it is doing the best it can, there will inevitably be points falling outside the specification limits, since points may fall anywhere within the control limits for a process that is in statistical control. In such a case, a point outside specification limits,

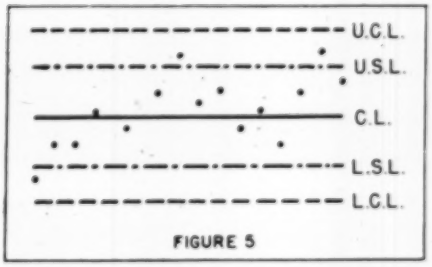

FIGURE 5

although it is within control limits, represents characteristics of unacceptable quality. Therefore although the process is under control, some scrap will inevitably be manufactured. As has been stated before, no amount of adjusting or tinkering with the process will improve the situation. Nothing short of a major change in the process such as new machines, new methods, new materials, or different operators will bring the control limits closer to the central line. If the specification limits cannot be widened, either the process must be completely changed or the unacceptable quality items must be screened by 100 per cent inspection.

Manufacturers who have been using statistical control state that, in many such instances, a conference between the manufacturer and the user of the product has often resulted in a relaxing of the specification limits. When all parties concerned are familiar with the assurance in quality that is given by a process that is under statistical control, they usually find they do not need the protection of extremely tight specification limits.

Who Can Apply the Method?

Many manufacturers, hearing of statistical control, would like to try it but are frightened by the word "statistical." They fear the need of a highly trained statistician to do the job. Actually, such is not the case. In fact, it is much better to take a person already familiar with the manufacturing process and then teach him how to use statistical quality control. It has been aptly and accurately stated that statistical quality control is less than five per cent statistics and over 95 per cent engineering or technical knowledge of the process under consideration.

Any person with as much as high school training in algebra and arithmetic can make the calculations necessary to draw the control chart and place the production points on it. In most plants, relatively low-salaried clerks do this part of the work. Once the charts are prepared, they are studied by the chief inspector or production engineer, or whoever is in charge of quality control. If the person in charge has had sufficient training in the control of quality through statistical methods, he is then able to interpret the charts and to take whatever action they indicate to be necessary.

During the war years, statistical quality control was taught to chief inspectors and engineers from war plants in ten-day intensive courses. It was found by experience that a person familiar with a manufacturing process could be taught enough statistical quality control in ten 8-hour days to enable him to start using the process successfully in his own plant.

These ten-day wartime courses were taught under the auspices of the Office of Production Research and Development. Since the close of the war, several schools scattered throughout the United States have continued to offer ten-day intensive courses in statistical quality control, once or twice a year. The tuition charge, which includes all the necessary books and materials, is usually around $100. More and more manufacturing plants are learning that it is highly profitable to meet the cost of training their personnel in this new method of controlling quality. In most instances, the first application of statistical quality control results in a saving to the manufacturer that more than meets the entire cost of the course.

The use of statistical quality control, then, simply adds a few easily employed statistical tools to the store of knowledge already possessed by the men responsible for the control of quality of manufactured articles. These tools, however, enable a quality control department to bring to bear on its tasks the powerful theorems long used by the statistician.

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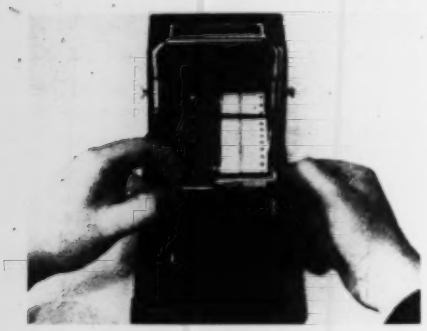
Have You Seen This?

Recording Gage Posts Its Own Quality Control Chart

Realizing that the recording of measurements and the application of statistical quality control would be greatly facilitated by incorporating the control chart in the inspection instrument, Federal Products Corporation developed the illustrated Model 500 Recording Gage. This device saves considerable time for the inspector since it automatically posts



its own chart. Also human errors in reading the gage and recording the measurements are eliminated.

PNEUMATIC REVERSIBLE SCREWDRIVER

Scarcely larger than a fountain pen, the Cleco A-1 Screwdriver is especially designed to speed production jobs that require driving many small screws and other fasteners up to the equivalent of No. 8 machine screws.

Small size, light weight and freedom from torque reaction combine to make the Cleco A-1 exceptionally easy to handle. Operator fatigue is reduced, making possible continued high production with minimum spoilage of work and markedly reduced overall costs.

The balanced impact mechanism absorbs the driving torque, permitting finger-tip operation and control. There is no possibility of the tool twisting in the operator's hand or jumping out of the screw slot.

The Cleco A-1 Screwdriver is extremely economical in air consumption during operation. Also, since the throttle valve is opened by pressure on the bit, wasteful "free running" is eliminated.

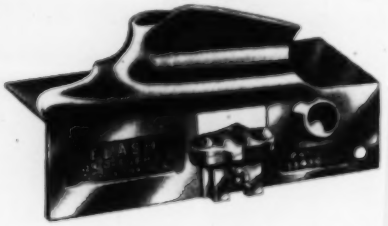
Rotation is easily reversed — making it possible to remove screws rapidly. External adjustments for power and reversing make disassembly of the tool for adjusting unnecessary.

Length, 5-7/16"; Maximum Diameter, 21/32"; Weight, 9-1/2 ounces; Capacity, No. 8 Machine Screws or equivalent.

The Cleco A-1 Pneumatic Reversible Screwdriver is manufactured by the Cleco Division of the Reed Roller Bit Company, P.O. Box 2119, Houston 1, Texas.

Flash Box Opener

Flash Box Opener Co., Inc., 52 West Houston Street, New York 12, N. Y., announces an improved Flash Opener. It is the only carton opener with the exclusive patented blade holder that is speedily adjusted to cut varying thicknesses of carton covers. This amazingly new and patented box opener opens any carton quicker and cleaner. The Flash Box Opener protects contents of cartons because it penetrates exactly under the outer cover thickness. It cuts cleanly, permitting reuse. Flash Box Opener pro-



tects the user from injury. The Flash Box Opener is made of durable zinc.

NEW CARDINEER FILE ROTATES HORIZONTALLY

No "in the hat" record-keeping system is this new Cardineer Horizontal Rotary File. It brings orderly record-keeping where activity is high and an inefficient system would waste time and money.

As a rotary file, it's unusual in that it revolves in a horizontal, instead of a vertical, plane. Thus, all the records are in a natural position for posting or reference without removing them from the rotor.

This compact unit well serves the requirement where breaking down of large concentrations of records into small work-units gains the advantage of a high degree of control and accessibility. Where there is a large amount of casual reference by persons other than the regular operator, this breakdown of records allows several persons to us them free of interference with each other — saving the time that would be lost otherwise.

Each file holds up to 2,700 records in a convenient working position — no containers to open; no drawers to pull out. A natural, wide-open working "V" makes it easy to post to the records in their normal position on the rotor. All the advantages of Cardineer Rotary Filing — better control of motion, space, time, and economy — are now offered for smaller installations through this horizontal Cardineer.

No adjustment is necessary when adding or removing a record — records are added or removed in one motion at any place in the file.

Records are housed on three removable trays, allowing distribution of record-keeping work. These trays are self-supporting when off the rotor.

Records in a large variety of sizes up to 8 x 8, or 9 x 5½ inches, can be accommodated on this all-steel file. This new addition to the Cardineer line is manufactured by Diebold, Inc., Canton 2, Ohio.

5-In-1 Socket Wrench Set Saves Time

Eliminate the element "find socket wrench" by putting Smitty, the compact 5 unit socket wrench set, in the pockets of the maintenance men. Write to R. N.

Hunter Sales Co., Los Angeles 23, Calif. for details.

VOICE COMMANDS OPERATE BI-LINGUAL ELEVATOR

A bi-lingual elevator was demonstrated to conferees of the recently held Building Owners and Managers Association convention in Montreal, Quebec, Canada — the French and English speaking city.

The elevator operator didn't pull a handle, or push a button, or even touch a button. But when he called out "going up" or "monter" into a microphone, the elevator doors closed immediately and the car rose to its destination. He

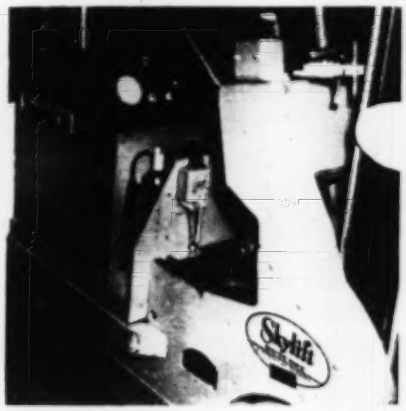
called out "down please" or "descendre" and the car returned to its starting position.

The elevator car was a model, one foot high, that responds to voice commands — in English or French.

The bi-lingual elevator travelled up and down between three "floors" in a ten-foot-high model hoistway. The passenger cab and hoistway were complete with working miniatures of all the standard equipment found in elevator installations — safety, speed governor, counterweight, oil buffers, guide shoes and guide rails.

Two-way Radio — The Latest Handling Aid

Two-way radio sets on fork trucks are the latest wrinkle devised by materials handling engineers to cut costs. Wasted



time and traveling without loads are slashed by up-to-date communications. Photo shows a Skylift electric truck, made by the Automatic Transportation Company, Chicago, equipped with a Motorola two-way short wave set. A fleet of seven Skylift trucks have been equipped this way at the Johnson & Johnson shipping center, Metuchen, N. J.

SIMPLIFIED PACKAGE HANDLING

The "Beacon Claw" simplifies box and package handling, is extremely lightweight yet has a capacity of 500 pounds to 1000 pounds. The grab exerts its own pressure, the heavier the load the tighter it holds. Heat treated spurs in the jaws are easily replaced, and narrow jaws allow for close stacking. Other jaws are lined with non-slip material for handling cartons. Handling of boxes and cartons is expedited because of the ease with which it operates. Operation involves merely setting it over a box and lifting.

The grab is made in three standard sizes: 4" to 10", 10" to 20", and 20" to 30". Variations of these sizes as well as a variety of jaw designs may be obtained. For further details, write to Cleveland Beacon Products Co., 1480 Lakeside Ave., Cleveland 14, Ohio.

AUTOMATIC TIME

By WILSON J. BENTLEY

A DEVICE for automatically recording time elements has been designed by Mr. H. G. Thuesen, Professor of Industrial Engineering and Head of the School of Industrial Engineering at Oklahoma A. & M. College. This Time Recorder was constructed in the Oklahoma A. & M. College Engineer Experiment Station and is now being used by the School of Industrial Engineering in connection with Time Study Research, Training, and other similar activities.

In ordinary practice, time study readings are taken with a decimal timer which records to 1/100 of a minute. In using a decimal stop watch, the time study observer must record the action taking place, note the watch reading at the end of an element, and then record the time noted. This common practice necessitates the shifting of the observer's attention from the work being observed to his watch, and then, to the time study observation sheet. For short cycles of time, as encountered in time and motion study research, the accuracy of the observer in noting and recording the elemental times leaves much to be desired. Designers have sought to overcome the short comings of the decimal stop watch by employing a Kymograph in which electrically controlled scribers record on a moving tape. Since a linear distance on a tape in this device is a measure of elapsed time, it becomes necessary to make linear measurements of the distances between records made by these scribers. It can be readily seen that the work of reading the distances on the tape becomes a limiting factor in making an extensive research or when time values are needed immediately after they have been recorded.

This timing device which Professor Thuesen has designed records the time of the occurrence of an event to 1/1000 of a minute directly in numbers placed in order of their occurrence on a roll of paper. The device is manually operated to the extent that the operator must depress a small lever at the instant a recording is desired. By this action the time is recorded on the roll of paper. The Time Recorder has guides which enable the observer to write in symbols and words the description of the time reading. Thus the subject may be observed even when readings are being made and recorded. The device actually has three spaces which the observer may use. These spaces are placed so that he may record the description either previous, during, or after the recording of the time.

To describe the Automatic Time Recorder more specifically, it can be said that the elements of time are obtained by driving two print wheels with a synchronous induction motor. These wheels are graduated from 00 to 99 around the circumference and are geared so that they record to the nearest 1/1000 minute. When a recording of an element of time is desired, a lever is operated with the thumb, or index finger, which causes three synchronized movements to take place. First, a continuous strip of paper is advanced to a new position and stopped. Second, a hammer surrounded by an inked ribbon falls on the paper directly over the print wheel recording the time at the instant. Third, at the end of the travel, the inked ribbon advances to a new position. Releasing the actuating lever causes the mechanism to adjust itself for the next recording. The result is a continuous strip of paper being reeled upon a removable spool bearing time recordings in minutes, tenths, hundredths, and thousandths of a minute together with identifying marks and symbols inserted by the operator beside each recording.

The recorder is light in weight and easily portable. It has a 15 foot electrical cord which allows the recorder to be used under most shop and plant conditions. The experience of Professor Theusen and members of his staff with the Time Recorder indicates that it will prove to be an efficient means for research and training in time study. Experimentation further indicates that the use of this device can be a valuable aid in both educational and industrial organizations where accurate time measurement is essential.

The automatic time recorder serves a need between that served by decimal timers and a more complex device designed by Professor Thuesen for the University of Iowa. The later device automatically records 12 elements to 1/10,000 of a minute. This timer was built by The University of Iowa and The Western Electric Company for research in motion economy.